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MILLET DISEASE IN HORSES.*

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DURING the winter of 1891 and 1892 a disease existed among horses that had been fed on millet. It was known as millet disease, and existed to a great extent wherever millet was used as food. There was an average death-rate from seven to ten per cent. On many farms the death rate was considerably higher, while on others no animal succumbed to the disease. A few of the animals affected became permanently diseased, the disease having settled in the joints.

The condition of the millet at the time of harvesting seemed to make no difference in regard to the virulence of the attack. That which was cut when about one-fourth headed produced the same results as that which was fully headed, or that which had partly ripened.

The symptoms as observed were as follows: For a number of days previous to the attack the kidneys acted very freely. This continued several days, when their action became much less than the normal. Muscles of shoulders, chest, loins and haunches stiff and sore. Later on there is soreness of the joints, usually the stifle and hock. This often changes from one leg to another, or from the hind to the fore extremities. There are well-marked symptoms of pain, with a slight amount of fever. The temperature usually varies from 102 to 104 degrees. In exceptional instances it may reach 106 degrees, but it soon recedes. The pulse is more frequent and hard. The fever is remittent rather than continued, and varies according to the intensity of the pain. At no time is

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the animal free from pain or fever during the course of the disease. It is a continued succession of ups and downs, gradually growing less marked, until the disease finally comes to an end. Membranes of the eye reddened, tongue coated, mouth hot, dry and sticky, having a peculiar sour odour. Bowels constipated, urine scanty, thick and stringy. The pain in the muscles causes the animal to assume a cramped or drawn-together position, with back arched and a well-defined line along the lower ends of the ribs. He has no disposition to move, but if made to do so, has a straddling, ungainly, painful gait, frequently groaning at every step. Occasionally the animal lies down and is unable to rise, more from the severe pain than from any changed condition of the muscles or joints. At first there is profuse sweating, especially in the region of the affected muscles. The animal will flinch and show more or less evidence of pain; or if pressure be applied to the affected joints, the same result will be manifest. If the horse be down he will lie comparatively quiet, and occasionally makes a feeble effort to rise. The intense pain that this movement causes induces quietude again, and it is seldom that he will rise, even if persistently urged to do so. There is loss of appetite, the animal generally assuming a pained expression. Should any region other than the one just indicated be affected, similar symptoms will manifest themselves by special movement or manipulation of the diseased part.

When the disease occurs in mares, there is frequently slight tumefaction of the vulva, which extends a variable distance into the vagina. Underneath the external membrane the connective tissue is engorged with serum, until in some instances the swelling assumes an immense volume. Fomenting the swollen parts for a considerable length of time (from one-half to two hours) reduces them to nearly their normal condition. The effect, however, is not permanent, the parts becoming infiltrated in the course of two or three hours. The above condition exists regardless of pregnancy, animals not in foal showing the same condition as those which are in foal. I am at a loss to state what would induce the above symptoms, unless they are merely the external manifestation of a general diseased condition of the generative and urinary organs. Pregnant mares showing the above symptoms do not always abort, but give birth to a healthy foal at the end of the usual period of gestation.

A number of those cases which came under my observation showed well-marked pleuritis and pleurodynia, the pleurisy

being very severe and accompanied by a fever ranging from 103 to 104 degrees. With vigorous treatment it usually subsided within twenty-four to forty-eight hours; the joints then became gradually affected until the typical form was established.

Duration of the Attack.—There is no definite limit to the time a horse may suffer from a single attack. Mules, which also are subject to the disease, have a severer form which lasts much longer. As far as my experience goes, I have never seen a mule recover entirely in less than from five weeks to as many months, and they are more apt to remain permanently unfit for work.

Some cases recover in a week or ten days, while others linger for several weeks or months. This is especially the case if the acute form gives way to the chronic. Colts yield more readily to treatment than older horses. In fact, the older the horse the more severe will be the disease.

In describing the various cases to which we shall allude, the history, surroundings and treatment of the animals prior to the attack, symptoms, treatment and termination of the disease, will be considered in each individual instance. We will not attempt to describe all cases we have treated, but select the first two and the last two, as we consider them a fair average of the total number.

Case I.

Bay mare, eight years old, weight about 1,150 to 1,200 pounds; in foal, due in two months; was found lying on her right side; health previously good; had never been sick while in possession of present owners, who purchased the animal at five years old; bred and raised in Iowa.

Surroundings.—Barn low, housed forty mules and horses; no special means of ventilation; ceiling covered with frost which had been gradually melting and dropping down upon the stock, all of which were more or less wet; fed on millet in good condition, cut when about one-fifth head out; grain consist of bran principally, some receiving one feed of oats per day; during the day the stock ran in a yard, having access to wheat straw.

Symptoms.—Animal was found lying on her right side, rising on haunches like a dog, and groaning as though in intense pain; breathing distressed, number of respirations increased to eighteen per minute, flank and shoulder covered with sweat; manipulation of hock and stifle joints induced severe pain; pulse 80, wiry and full; temperature 104° F.; the

animal was raised by means of slings, and after remaining in them for half-an-hour was able to stand without assistance, but would not move; the lips of the vulva were much swollen, having a semi-transparent appearance; the evacuation of the bowels showed the secretion to be normal; urine scanty, clear and light coloured; the breath had a disagreeable, sour odour.

The case was diagnosed as rheumatism, and the following treatment prescribed: Fomentation of the vulva until swelling disappears; pure water containing nitrate of potash in quantity sufficient to allow two oz. per day; hay and bran, dry bedding; use of sling, and internally sodium salicylate, 2 oz., aqua, 8 oz. Give one ounce every six hours.

Saw the animal two days later, when a marked improvement was noticed; temperature, 102·5° F.; pulse, 60 and not nearly so wiry; respirations, 12 per minute: appetite good; water taken in moderate quantities; changed the treatment by discontinuing the nitrate of potash, and giving the following: Sodium salicylate, 2 oz.; fl. ext. gentian, 2 oz.; aqua, 8 oz. Give one ounce three times per day.

Did not see the mare again, but was informed that she entirely recovered in about ten days, and when due gave birth to a healthy foal.

CASE II.

Sorrel mare, eleven years old, due to foal.

History.—Health good; had never suffered from any disease; had raised two colts, both of which were healthy. For several days previous to my visit the mare showed lameness, which gradually increased in severity; loss of appetite; seemed to drink more than usual; first indication of lameness in left hind leg; was then called to prescribe for the mare.

Surroundings.—Barn contained carriage room, one box and three single stalls; ventilation poor, ceiling covered with frost, which was melting and dropping on the stock; floors so wet that bedding was wet all the time.

Feed.—Millet, hay and straw. The millet and oats had been seeded together, and both were headed when cut for hay. Grain ration consisted of two quarts nice clean oats as a feed three times per day.

Symptoms.—At time of consultation there was only a small quantity of urine secreted, light coloured and clear; great lameness in left hind leg; all the joints were affected, the hock, stifle and fetlock being especially sore and tender to the touch; tucked up appearance of the abdomen; respiration, 12 per minute; temperature, 102·5° F.; the animal would

stand up part of the time, disliked to lie down, and when down would not rise unless urged to do so; the third day after the attack she foaled a healthy colt; through the carelessness of the attendant the colt became chilled by being allowed to lie in the water which came to it, and died in thirty-six hours. The mare refused to get up; was then placed in slings, and during her endeavours to stand ruptured the tendon of the flexor pedis perforatus of the right hind foot at its insertion. She was then destroyed.

Treatment.—Consisted of stimulants and salicylate of soda and nitrate of potash. There was an improvement up to the time of foaling, but at that time the symptoms became aggravated.

Case III.

History.—Bay mare, age unknown, had given birth to a healthy foal three weeks prior to my being called. Foal healthy at present time (seven months old).

Surroundings.—Ventilation imperfect; banked barn; walls dry; fed on millet hay two-thirds headed out; oats, three quarts.

Symptoms.—Found the animal lying down; endeavoured to get up by the use of slings; would not bear any weight on hind legs; pain upon pressure of any of the joints of hind leg and also in gluteal region; temperature, 104° F.; respiration, 20; pulse, 70; rigors and distressed appearance.

After thirty-six hours' treatment the attendant attempted to raise the mare and let her drop, killing her almost instantly. During the struggle she ruptured the gastrocnemius exturnus at its insertion, allowing the summit of the os calcis to protrude through the skin.

Post-Mortem Appearances.

I made a *post-mortem* examination of both of the hind legs, and found them essentially the same in morbid appearances. I will describe the lesions as they occurred in the left hind leg, those of the right leg being fully as severe. The tendon of the abductor magnus was torn from its attachment, and carried with it particles of bone; the portion of bone which was removed was nearly circular in shape, a little pointed at the upper extremity, and in all covered about one and one-half square inches; the popliteus was also torn loose from its insertion, and carried with it small particles of bone; the bone exposed was somewhat softened; it was also severed from its attachment to the capsular ligament of the stifle joint; the capsular ligament of the petella showed marked infiltrations,

with a diminished supply of synovial fluid ; in fact, the absence of synovial fluid was well marked in all the joints, there being scarcely a trace left in some of them. The insertions of the triceps abductor femoris, the tensor fascia lata and quadriceps cruralis were also torn loose from the bone, and, as was the case with the other muscles, carried with them particles of bone ; the bursa at the side of the hock through which the tendon of the peroneus muscle passed was dry, and contained scarcely a trace of synovial fluid ; the parts adhered to each other, showing that the condition had existed for some little time previous to death ; the gastrocnemius externus was also ruptured from its attachment, allowing the hock to become flexed ; the summit of the os calcis protruding through the soft tissues and skin, so that it was exposed to sight ; no synovial fluid found in the hock joint. The external straight ligament of the patella, the oxternal middle inferior sesamoidean, ligament, the right branch of the superior sesamoidean, the lateral ligaments of the pastern joints and the two posterior ligaments of the same joint, were torn from their attachments ; the capsular ligament of the fetlock joint was perforated at its postero-infero aspect, and also near the centre of the postero-internal aspect.

The Joints.—The distal extremity of the femur presented indentations on both condyles and trochlea. On the condyles they were small, pit-like, some round, some oblong, while some were long and narrow, having the appearance of a line. The trochlea was smooth, and at its inferior portion the cartilage had become nearly worn away, so that distinct grooves were noticeable where it came in contact with the patella.

The Patella.—The texture of the patella was spongy, being not nearly so hard and compact as the average. A portion of its ligamentous attachments had given away, exposing the cancellated structure of the bone. Its posterior surface, which articulates with the trochlea of the femur, and especially the innermost concavity, contained numerous indentations exhibiting partial destruction of the cartilage. These indentations were nearly all oval, a few of them triangular in shape, pit-like, and some of them quite deep. In the chest, inside the lateral borders, abrupt eminences, composed wholly of cartilage, existed.

The Tibia.—The promixal extremity showed indentations similar in character, but not nearly so numerous as those which existed in the distal extremity of the tibia, and also showed more marked deterioration than any of the other joints in the limb. The cartilages in the articular grooves

had completely disappeared in the centre, leaving the bone exposed. The disease had not existed long enough evidently to allow porcelaneous deposit to take place; it was somewhat roughened in character. The ridges of the astragalus contained numerous small indentations at their acute angle, and showed an almost entire absence of the articular cartilage.

Fetlock Joint.—Changes similar to those of the femoral, patellar and tibial joints. The pastern joint showed very little change, and that on the distal extremity of the os suffraginus. All the articular surfaces of the os coronæ, of navicular and os pedis were normal, with the exception of two small spots which existed on the articular surface of the os pedis where it articulates with the os corona.

The ill effects of the feeding of millet occurs mostly during cold weather, and in horses that are not at work. Whether cold of itself is an important factor or not we are unable to say, but we think it has more or less to do with the diseased condition. One very important factor is the want of proper ventilation. The greatest number of affected animals belonging to any single farm were invariably found in barns where ventilation was the poorest. In fact we cannot call to mind but a very few cases where the ventilation was good. These cases were less severe than those where the stables were illy ventilated. They also recovered much more quickly.

The question of proper ventilation is not so serious a one where extremely low temperatures do not occur. But where there is extreme cold, as in our region, the thermometer going as low as –40 to –50 degrees Fahr., and remaining below 20 degrees F. for several weeks at a time, and accompanied by high winds, then the matter of properly ventilating a barn becomes a serious question.

On September 7th, 1893, we began a series of experiments to determine accurately the effects of millet upon horses. We selected three geldings, one three years old, one five years, and the other six years. The three-year-old could not be handled satisfactorily, and was thrown out after having been in the experiment for five days. The other two were continued over a period lasting from September 7th to October 4th inclusive. The first period lasted from September 7th to September 20th, it being a preliminary one. During that time the horses received hay and oats. On September 20th the feed was changed from hay to millet, the same number of pounds of millet being given as they had consumed of hay. The millet was less than half headed out, and was secured in

1893.		HARRY, S. G., 7 YRS. OLD.								JIM., BL. G., 5 YRS. OLD.							
		Tem. Fah.								Tem. Fah.							
		Air	Horse.	Water.	Hay.	Oats.	Salt.	Urine.	Weight.	Air.	Horse.	Water.	Hay.	Oats.	Salt.	Urine.	Weight.
				lbs.	lbs.	lbs.						lbs.	lbs.	lbs.			
Sept.	A.M.	54	.....	30	8	4	....	....	....	....	.....	15	8	4	....	....	....
7	N.	64	.....	41	8	4	....	....	....	....	.....	13	8	4	....	....	....
	P.M.	67	.....	22	8	4	....	....	....	....	.....	40½	8	4	....	....	....
	A.M.	65	.....	20	8	4	....	....	....	....	99.8	35	8	4	....	....	....
8	N.	82	109.6	9	8	4	....	....	....	....	99.8	0	8	4	....	....	....
	P.M.	83	100.2	44	10	4	....	....	....	....	100.4	41	8	4	....	....	....
	A.M.	65	100.2	29	10	4	....	....	....	....	99.8	36	8	4	....	....	....
9	N.	84	100.4	21	10	4	....	....	....	....	100.	11	1	4	....	....	....
	P.M.	80	100.6	13	14	4	....	....	....	....	100.6	43.5	8	4	....	....	....
	A.M.	65	99.8	40.5	9	4	1 oz.	....	....	....	99.4	22	7	4	1 oz.	....	....
10	N.	83	100.8	0	9	4	....	....	....	....	100.2	11	7	4	....	....	....
	P.M.	75	100.4	62	9	4	....	....	....	....	100.	41	7	4	....	....	....
	A.M.	75	100.4	56	9	4	1 oz.	....		....	100.	37	7	4	1 oz.	....	
11	N.	89	100.2	28.5	9	4	....	..		....	99.8	14.6	7	4	....	....	
	P.M.	80	101.8	55.5	9	4	....	....	1390	....	101.	53	7	4	....	....	1358
	A.M.	67	100.	15.5	9	4	....	....		....	100.2	11	7	4	....	....	
12	N.	84	100.8	14	9	4	...	....		....	100.8	28	7	4	....	....	
	P.M.	84	101.6	60.5	9	4	....	....	1368	....	101.4	37.6	....	....	....	....	1238
	A.M.	70	101.4	35.5	9	4	1 oz.			....	101.2	38.6	3.5	4	1 oz.		
13	N.	82	101.	25	9	4	....			....	100.8	13	7	4	....		
	P.M.	67	100.6	47	9	4	....	lb. oz.	1370	....	101.	27.5	7	4	....	lb. oz.	1245
								17 14								12 8	
	A.M.	54	100.4	10.5	9	4	....			....	106.	12	7	4	....		
14	N.	77	100.8	23	9	4	....	lb. oz.	1360	....		14.6	7	4	....	lb. oz.	1250
	P.M.	66	.....	30	9	4	....	17 14		....	....	44	7	4	....	16 8	
	A.M.	54		20	9	4	....	....		....	.....	26.5	7	4	....	....	
15	N.	62	100.2	11.5	9	4	....	....	1340	....	100.	18.5	7	4	....	....	1235
	P.M.	58	100.4	36.5	9	4	1 oz.	...		....	100.6	25	7	4	1 oz.	....	
	A.M.	41	100.4	21	9	4	....	....		....	100.	13.5	7	4	....		
16	N.	62	101.2	22.5	9	4	....	....		....	101.	26	7	4	....	....	
	P.M.	62	100.6	37.5	9	4	1 oz.	....	1350	....	100.6	26.5	7	4	1 oz	..	1245
	A.M.	56	100.2	3	9	4	....	lb. oz.		....	100.2	6	7	4	....	lb. oz.	
17	N.	76	100.4	45.5	9	4	....	13 8		....	99.8	45.5	7	4	....	13 3	
	P.M	74	100.6	36	9	4	1 oz.	....		....	101.2	28	7	4	1 oz.	....	
	A.M.	48	100.8	40	9	4	....	....		....	100.2	28.5	7	4	....	lb. oz.	
18	N.	59	.....	0	9	4	....	....		..	.....	0	7	4	....	15 3	
	P.M.	53	100.	38	9	4	1 oz.	....	1340	....	99.8	27½	7	4	1 oz.	*1.047	1225
	A.M	40	100.8	27	9	4	....			....	101.	26	7	4	....		
19	N.	56	100.2	3	9	4	...	lb. oz.		....	100.	0	7	4	....	lb. oz.	
	P.M.	54	100.4	10	9	4	1 oz.	15 14	1335	....	100.4	39½	7	4	1 oz.	10 11	1230
	A.M.	57	100.2	19½	9	4	....			....	100.4	20	7	4	....		
20	N.	70	101.	0	9	4	....	lb. oz.		....	101.	0	7	4	....	lb. oz.	
	P.M.	75	100.2	56	9	4	1 oz.	14 0	1340	....	100.	53	7	4	1 oz.	10 8½	1230
	A.M.	51	100.2	44	9	4	....	21 0		....	101.	35	7	4	....	18 8	
21	N.	58	100.8	23.5	11	4	....	*1.046		....	100.4	23.5	9	4	....	*1.044	
	P.M.	56	100.6	33.5	9	4	1 oz.		1338	....	100.4	34.5	7	4	1 oz.		1215

At 6 p.m. of the 20th, millet was substituted for hay, and continued as the coarse feed. The millet was nearly half-headed out. No heads were fully developed.

Temperatures are Fahrenheit. Weights are lbs. and oz. Urine record extends from 6 a.m. to p.m. (24 hours). *Specific gravity.

good order: the oats were old, and in good, first-class condition, the same oats being fed during both periods. On October 1st, hay was again substituted for millet in order to place the animals again in a normal condition. The results of this experiment will be found in the accompanying tables.

1893.		HARRY, S. G., 7 Yrs. Old.								JIM, Bl. G., 5 Yrs. Old.							
		Tem. Fah.		Water.	Millet.	Oats.	Salt.	Urine.	Weight.	Tem. Fah.		Water.	Millet.	Oats.	Salt.	Urine.	Weight.
		Air.	Horse.	lbs.	lbs	lbs.				Air.	Horse.	lbs.	lbs.	lbs.			
Sept. 22	A.M.	41	100.6	0	9	4	....	23 1⅛ *1.045	1340	....	100.8	0	7	4	....	23 1⅛ *1.045	1238
	N.	57	99.8	39.5	9	4	....			....	98.8	41.5	7	4	....		
	P.M.	63	100.4	45	9	4	1 oz.			....	100.4	35	7	4	1 oz.		
23	A.M.	36	100.	0	9	4	1 oz.	33 11⅛ *1.038	1342	36	99.6	0	7	4	1 oz.	27 5 *1.038	1212
	N.	50	99.2	35	9	4	....			50	100.	42¾	7	4	....		
	P.M.	49	100.	50	9	4	....			49	100.6	13⅜	7	4	....		
24	A.M.	37	101.	29	9	4	1 oz.	33 11⅛ *1.031	....	37	100.4	36	7	4	1 oz.	28 8⅛ *1.032	....
	N.	47	99.8	8	9	4	....		....	47	98.8	0	7	4	....		....
	P.M.	42	99.8	39½	9	4	....		....	42	100.	35½	7	4	....		....
25	A.M.	32	100.6	33	9	4	1 oz.	lb. oz. 11 26	1355	22	100.4	32⅓	7	4	1 oz.	lb. oz. 24 12	1225
	N.	48	99.8	43	9	4	....			48	99.6	26	7	4	....		
	P.M.	42	99.4	37	9	4	....			42	100.4	34	7	4	....		
26	A.M.	35	101.	0	10	4	1 oz.	24 3 *1.041	1350	35	100.6	26½	8	4	1 oz.	29 1 *1.037	1235
	N.	48	100.6	45¼	10	4	....			48	100.8	38	8	4	....		
	P.M.	46	100 6	33⅜	10	4	....			46	100.4	34½	9	4	....		
27	A.M.	30	101.	34½	10	4	1 oz.	25 2 *1.041	1345	30	100.4	28	9	4	1 oz.	36 8 *1.032	1238
	N.	50	100.	31	10	4	....			50	99.8	20	9	4	....		
	P.M.	48	100.4	52½	10	4	....			48	100.6	34	0	4	....		
28	A.M.	39	100.4	12	10	4	1 oz.	36 8 *1.030	1358	29	100.6	19½	8	4	1 oz.	26 8 *1.032	1235
	N.	58	100.4	34½	10	4	....			58	100.	27	6	4	....		
	P.M.	57	101.	56½	10	4	....			57	100.4	35	7	4	....		
29	A.M.	53	100.6	0	10	4	1 oz.	34 3 *1.041	1360	53	100.8	28	7	4	1 oz.	29 1 *1.075	1250
	N.	51	100.2	40¼	10	4	....			51	100 4	18	7	4	....		
	P.M.	49	101.	42½	10	4	....			49	100.2	35½	7	4	....		
30	A.M.	48	100.4	0	10	4	....	35 8 *1.043	1362	48	100.4	11	7	4	....	29 2 *1.041	1238
	N.	52	101.	35	10	4	....			52	100.4	25	7	4	....		
	P.M.	41	101.8	69	10	4	....			41	100.6	44½	7	4	....		
Oct. 1	A.M.	51	100.6	6	9	4	1 oz.	....	....	....	98.8	14½	7	4	1 oz.	....	....
	N.	51	100.8	27	9	4	....	....	....	....	100.	0	7	4	....	....	....
	P.M.	47	101.	47	9	4	....	....	....	....	100.4	36	7	4	....	....	....
2	A.M.	37	100.4	0	9	4	1 oz.	29 5 *1 035	1362	....	100.2	23	7	4	1 oz.	24 3 *1.043	1252
	N.	39	100.8	14	9	4	....			....	100.4	0	7	4	....		
	P.M	43	100.4	28	9	4	....			....	101.	45¼	7	4	....		
3	A.M.	40	100.4	25	9	4	1 oz.	15 11 *1.049	1364	....	101.	25	7	4	1 oz.	10 4½ *1.051	1252
	N.	57	100.4	2	9	4	....			....	101.	10	7	4	....		
	P.M.	52	100.6	52½	9	4	....			....	100.6	42	7	4	....		
4	A.M.	44	101.	32	9	4	1 oz.	17 14 *1.041	1358	....	100.6	15	7	4	1 oz.	14 10 *1.045	1245
	N.	54	100.2	0	9	4	....			....	100.4	9½	7	4	....		
	P.M.	52	100.4	49	9	4	....			....	100.6	47	7	4	....		

*Specific gravity.

Note.—Both horses were changed from millet to hay the evening of October 1st. On the 27th of September Harry passed urine 27 times, exhibiting considerable pain. Jim had two attacks of colic, September 22nd and 27th. From the 23rd to the 27th Jim moved about with a straddling gait when first moved. During the whole trial both horses were either driven or ridden for exercise. The distance was from 8 to 12 miles a day.

Horse Harry.				Horse Jim.			
Date.	Nitrogen.	Total Solids.	Ash.	Date.	Nitrogen.	Total Solids.	Ash.
Sept. 13	1.55	9.50	2.05	Sept. 13	1.55	10.52	2.74
„ 17	1.58	11.65	2.90	„ 17	1.61	10.52	2.34
„ 21	1.16	10.08	1.88	„ 18	1.44	12.03	3.61
„ 25	.96	5.58	1.90	„ 21	1.21	9.50	2.26
Oct. 4	1.33	7.48	. . .	„ 22	1.12	....	....
				„ 25	.68	6.14	2.15
				Oct. 4	1.53	8.37	....

During the winter we shall continue our experiments in that line, using millet which is all headed for one lot, another lot partially matured, and a third lot ready for seed. We shall also feed seed as a grain feed instead of oats. Another line of experiment will be for the purpose of determining whether poorly gathered millet produces a more aggravated form of the disease than when it is gathered in good condition. We have found that millet is a very hard crop to secure in excellent condition. It readily moulds if there is much moisture during the process of curing. Should rain set in at that time and continue for a day or two, the millet invariably moulds to a greater or less extent. In fact, it is practically impossible to secure it so that the dust does not rise from it when it is shaken.

The chemical analyses were kindly made for me by Prof. Ladd and his assistant Mr. Whalen. They were conducted with a view of only determining the amount of nitrogen in each sample, and the amount of dry matter and ash.

A WOUND TRUSS.

BY VETERINARY CAPTAIN J. A. NUNN, D.S.O., F.R.C.V.S., ARMY VETERINARY DEPARTMENT, PRINCIPAL OF THE LAHORE VETERINARY COLLEGE.

THE annexed drawing represents a truss I have had made with the view of bringing pressure to bear on wounds, or on sinuses in open or neglected abscesses, etc., situated on the back and withers, and which are so commonly met with in military veterinary surgery, especially among pack animals.

When the wound opens from above downwards, as in Fig. 1, there is always a difficulty in getting pressure to act in the right direction if applied in the only manner by means of a body roller, as the traction is downwards, and there is a tendency in the wound to gape, and the edge, from the vertical

drag, to become everted, and unless pressure is applied, the margins of the sore will granulate, become hard and callous, and a thick lip will remain, which is always liable to become galled and abraised by the saddlery when the wound cicatrises. The truss shown in the drawing, Fig. 2, has been designed to obviate this downward drag and to bring the pressure to bear in an upward and lateral direction. It simply consists of a piece of light steel bent into the shape of the animal's body so as to encircle it, the edges being bevelled or rounded so as to prevent injury to the skin. At the upper portion are two oval plates, A^1 A^2, with a screw in the middle B, which fits in the holes at C C C C, so that the plates can be adjusted higher or lower as may be desired The plate is made slightly convex, the edges being slightly rounded off. The convex surface placed is next the wound, the screws being on the concave side. At the top is a long screw, D, with a thumb piece. This screw passes through both ends of the truss, so that these can be brought together with as much force as is required. At the lower portion, E, the truss is divided into two portions, which are kept together by a movable centre piece, F, and screws, G G G G, by means of which it may be made larger or smaller to suit the size of the patient. The weight of the truss is borne on the arch of the ribs at H H, so that there is no downward drag. The whole apparatus is made of iron and steel.

FIG. 1.
a. Margin of wound. *b.* Bottom of wound.

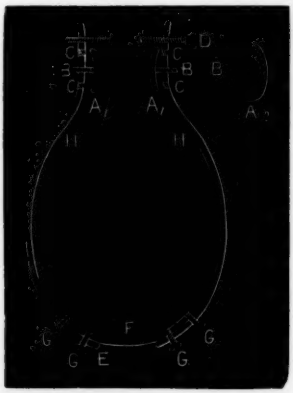

FIG. 2.

At first I had the plates A padded, but I have given this up as the padding only collected dirt and was difficult to keep clean and asceptic. Furthermore, with only the iron plate in contact with the lint dressing,

it is much more convenient to keep up continual irrigation when necessary, and the whole being painted with Aspinall's Enamel, the apparatus did not rust, even when irrigation was kept up incessantly for many days. I would, however, suggest that some of the instrument makers might improve it by making it in the same way that iron cups and dishes are, as the one I now have in use is of the roughest description, being fabricated by a native blacksmith.

This truss has been successfully employed in the hospital of the Lahore Veterinary College in numerous cases of bad sore backs and neglected sinuses with foul luxuriant granulations, also in cases in which it was necessary to exert pressure to keep the edges of wounds together after operations for the removal of tumours, and also in dealing with old callous cicatrices in which the margins had to be pared thin and a plastic operation performed.

A CONTRIBUTION TO THE STUDY OF DISEASES OF THE NERVOUS SYSTEM.

BY PROFESSOR H. J. P. THOMASSEN, VETERINARY SCHOOL, UTRECHT, HOLLAND.

(*Continued from page* 402, *Vol. XXXVII.*)

PROFESSOR SPINOLA,* of Berlin, treated a horse which had fistula of the left jugular vein, and suddenly the animal showed the following symptoms:—The head was kept bent round to the right side, while the mouth was drawn to the left side, this position being maintained during mastication. On the second day, profound stupor supervened, and when the horse was compelled to move it would have fallen on the right side if it had not been supported. The right eye was insensible to light, and the pupil was widely dilated; the right ear had lost the faculty of perceiving sounds, while the entire right side of the body had completely lost its sensitiveness. No matter where it was touched on that side, from the ear to the coronet, it gave no indication of feeling, even when deeply pricked by a pin. Notwithstanding these serious symptoms, the horse had completely recovered in five weeks, though vision was not quite restored until two months had elapsed.

Bizot† noted the following symptoms observed on a mare brought up for casting and sale from the army:—Head inclined to the left, the nose being turned to the right; *ménage* movements to the left; amaurosis of the right eye; well

* Thierärtzliche Zeitung, 1846. † Journal de Méd. Vétérinaire Militaire, 1864-65.

marked muscular weakness of the right side; tendency to fall down on the same side. Death was sudden.

At the autopsy numerous concretions were found in the plexus choriodes, the largest of which, about the size of a filbert, occupied the left plexus and *depressed the corpus striatum.*

Vidal* makes mention of a horse, four years of age, which had recovered from strangles, but which for some time could not see with one eye at one period or with the other eye at another, though the right eye was most frequently involved. The top of the head was directed to the left, the nose to the right. The right eye became diseased, then atrophied. During the course of the disorder the horse fell several times, and on each occasion on the left side. At the autopsy an abscess was found in the *posterior part of the right cerebral hemisphere.*

Storch† saw a horse with right-sided hemiplegia, ptosis on the right, slow pulse, disturbed respiration, and at times symptoms of psychical excitement succeeded by great depression. On making a *post-mortem* examination he found many small hæmorrhagic centres in the left cerebral hemisphere, and in the left cerebral peduncle was a hæmorrhagic patch measuring a half centimetre square. The ventricles contained twenty grammes of fluid.

Professor Roll‡, of Vienna, describes the case of a horse suffering from strangles, which was suddenly attacked with lymphangitis of the face, the left ear became pendant, the upper eyelid of the same side drooped over the eye, and the upper lip was drawn towards the right. Soon the globe of the eye became diminished in size, erosions appeared on its surface, and the aqueous humour became turbid, at the same time the region lost its sensibility. As the horse became emaciated it was destroyed. On an examination of the body, there was discovered a yellowish serous infiltration at the origin of the fifth and seventh pairs of nerves, well defined reddish softening of a portion of the pons Varolii, and alteration in the arachnoid membrane at the base of the brain.

In the case of a three-year-old greyhound bitch, carefully studied and described by Professor Chauveau,§ it appears that the creature only showed at first a certain degree of dulness, but it soon began to manifest weakness of the right side, the two limbs of that side being dragged along the ground. When the animal stopped it often remained immovable on its four feet for more than a quarter of an hour at a

* Journal de Méd. Vétérinaire Militaire 1863-'64.
† Oesterreich, Zeitschrift für Wissenschaftliche Veterinärkund, 1888.
‡ Vierteljahresschrift, 1862. § Journal Vétérinaire de Lyons, 1863.

time, the head being held low and inclined to the right, the nose almost resting on the ground; then frequently the limbs gradually lost their power, and the creature nearly fell over, which roused it from its stupor, and it began to move to the right in a wide circle. The sensibility of the right side was normal, and sight and hearing were unimpaired; though the two pupils were always contracted, were unaffected by light, and were covered by the membrana nictitans, which was pushed across the front of the eye. The heart's beats and respiratory movements became more and more hurried. An ulcer appeared on the left cornea, though the membranes and humours of the eye did not suffer. The animal at last lay almost constantly on its side, emitting plaintive cries.

At the autopsy there was found, on removal of the brain, a volumiuous tumour at the base of the cranium, in the large cavity of the anachroid; this tumour remained adherent to the bony wall. It was situated in the median line and occupied, from before to behind the space comprised between the anterior clinoid processes and the posterior foramen lacerum; from right to left it was limited by the petrous temporal bone, on the left side it impinged somewhat on the anterior surface of this bone, and it was even slightly prolonged into the sphenoidal fossa. Its left moiety was the thickest. The roots of the fifth pair of nerves appeared to be a little compressed inwards by the tumour, to the right as well as to the left. At the base of the brain this compression had extended to the crura cerebri and the pons Varolii, these parts being flattened and sensibly atrophied, though it was not possible to say with precision whether the left side was more atrophied than the right, but the tumour was firmly attached to the right crus, which was softer in its superficial layers. The corpora quadrigemini had undergone a considerable degree of wasting, and this was most marked at the testes eminences, the cerebellar isthmus being at this part constricted by the tumour and the free border of the tentorium cerebelli. The optic thalami also appeared to be somewhat atrophied.

We extract from the *Rapports des Vétérinaires Militaires Allemands* for 1888, the following cases: A horse which had been for a long time affected with paralysis of the right facial nerve, suddenly exhibited motor disturbance of the left side. The head and neck were drawn round to the right side, and the left hind leg more especially was dragged along when the animal walked. The left eye was involved. Sensation was not impaired and there was no psychical derangement.

At the autopsy there was discovered a tumour about the

size of a nut, lodged between the right petrous temporal bone and the cerebellum, the right hemisphere of the latter being atrophied, and the inferior part completely absent. The tumour—which was a fusiform celled sarcoma—was situated beneath the cerebellum, and had invaded the pons varolii and restiform body of the right side.

Another horse, during the manœuvres, suddenly showed symptoms of paralysis of the left limbs and died on the fifth day. On examination of the brain, there was found situated exclusively in the right hemisphere a patch of softening, the size of a five pfennig piece. The cerebellar pia mater was altered.

(To be continued.)

PREVENTIVE INOCULATION.*

BY H. G. BOWES, M.R.C.V.S., EASTWOOD, NOTTS.

(*Continued from page* 306, *Vol. XXXVII.*)

THE next theory is, that in natural immunity the tissues are endowed with a vital power of resistance to the development of certain organisms, and that in acquired immunity the tissues become endowed with this vital resistance. This theory, although very indefinite, seems the most feasible, though it is not agreed as to what form this vital resistance assumes.

Grawitz assumes that the cells of the body, in combating with the micro-organisms, if they succeed in defeating them, become hardier and more able to resist a future attack. But this is objected to by some, who say that in the fight between the tissues and micro-organisms, it is more likely that the tissues would be weakened and not strengthened by the combat.

Metschnikoff proved by experiments that the leucocytes energetically resist the action of micro-organisms, and greatly assist in removing them from the body; this is undoubtedly true as regards the general action of the leucocytes against any morbid matter existing in the body, but it does not prove any special resistance to particular organisms, as would necessarily be the case in the development of immunity from a certain disease.

These, then, are the principal theories advanced to explain immunity, and, in concluding this subject, I would like to point out that no one of them, takén alone, is satisfactory, as I have already shown from the arguments advanced against them. In the midst of this confusion of opinion, therefore, I

would like to suggest that this power of resistance is the result, not of a single change, but of a combination of changes. It seems to me absurd to assert that such a great property is developed by the body, as the result of some simple process; is it not more likely to be the result of a combination of more or less complete changes? For instance, an upholder of the antidote theory may bring forward in support of it the immunity which has been produced by inoculating with the soluble products of the organisms, without the presence of the organisms themselves; from this it would seem that the protective ptomaine, without doubt, afforded protection; but, then, if we look at it from another point of view, may it not be that this ptomaine induces certain changes in the tissues, by which they acquire a vital power of resistance against the disease, such as is assumed by Grawitz and others, is induced by the organisms themselves? In that case we should have immunity induced by a combination of those two processes.

History of Inoculation.—It is supposed by many people that preventive inoculation originated in Jenner's discovery of vaccination against small-pox. This is, however, erroneous, for inoculation against that disease has existed in some countries from time immemorial, but this was true inoculation of small-pox virus, not vaccination. Indeed, so long has it been in vogue that it is impossible to say in what country it originated, though some assert it originated in Circassia. It was also practised in Turkey, India, Africa, &c.

An idea as to the length of time this operation has been in practice may be gathered from the letter of a physician in 1726, in which he says that from inquiries made amongst Arabs, he found that some of the old men, 70 years old, remembered the practice as being in vogue in their young days, and they also said that it was a practice of their ancestors. At that time it used to be called "ingrafting" or "buying the pox."

It was first introduced into this country, openly, in 1721, chiefly through the efforts of Lady Wortly Montague; it was said, however, to have existed in Wales long prior to this.

The method of inoculating was either the introduction of the lymph from the pustule of a patient by pricking the skin, or the application of a pock scab, kept in its place by means of a bandage. In China the scabs were powdered, mixed into a paste, wrapped in cotton, and inserted into the nostrils; this, as you may suppose, often led to serious consequences. The Persians took the powdered pocks internally. Small-pox inoculation seems to have become very largely practised, and

with fair success, before Jenner's discovery was made. Long prior to that time there seems to have been a tradition amongst dairy-maids that those who had milked cows with cow-pox, were immune from small-pox, and it was this which led Jenner to study the subject. There is some doubt as to whether Jenner really was the first to vaccinate or not, as a Mr. Benjamin Jesty, farmer, of the Isle of Purbeck, is said to have vaccinated his wife and two sons with virus from a cow's teats, in 1774, and that they were afterwards insusceptible to small-pox.

In 1796 Jenner first vaccinated with cow-pox virus, and for a few years he continued his experiments, meeting with great opposition, but still successfully demonstrating the superiority of his method. In 1798 he published a pamphlet on the subject, which, at the time, was very adversely criticised.

Jenner evidently had no idea as to how vaccination gave immunity; indeed, it would seem that he regarded it not as a special vaccine against variola, but as having a more general action, somewhat as we regard a drug; hence we find him advocating the vaccination of dogs to prevent distemper, also advocating it as a treatment for rabies in dogs, which, from our present knowledge of the causes of specific diseases being specific micro-organisms, we know to be absurd. At first, vaccinators had many failures, and these Jenner always laid to the fault of the operator; and, no doubt, this was, in the majority of cases, true. At first, Jenner thought immunity for life was gained by vaccination, but, later, he found occasion to alter his views in that respect, saying that if complete immunity were not gained, yet any subsequent attack of small-pox, which the vaccinated person might have, would be much milder than with an unvaccinated person.

Subsequent investigators have tried to show the relation between rinderpest and small-pox; consequently, in the great cattle plague of 1865, we find that vaccination was tried extensively, but this proved an entire failure. I shall, however, refer to this when treating of rinderpest.

It was not until quite recent times, however, when micro-organisms were found to be the cause of specific diseases, that any great advance was made in preventive inoculation, and that it was applied to any extent to other diseases. If before that time inoculation was found to be efficient against a disease, it was discovered accidentally, as was the case in small-pox; but now that the nature of contagious diseases is known, investigators experiment systematically with the

virus of any specific disease, until some method of attenuation is found.

In 1880, Professor Greenfield, of Edinburgh University, found that by cultivating anthrax bacilli in aqueous humour, through several cultivations, he obtained a virus which, on inoculation, did not cause a fatal attack of the disease, and rendered the animal protected against the inoculation of a stronger virus. Shortly before that time, too, Sanderson and Duguid, of London, found that the virus taken from a guinea-pig dead of anthrax, did not kill cattle, and gave them immunity. Other eminent men have since greatly investigated the subject, amongst whom are Pasteur, Chauveau, Soussaint, &c., but their experiments will be reverted to when treating of anthrax.

Chauveau now suggested that immunity was due to the soluble products of the micro-organism, not to the organism itself; this he inferred from the fact that pregnant ewes, which had had anthrax and recovered, conferred immunity on their lambs. Now, bacilli cannot pass through the fœtal membranes; therefore, it must have been due to the passage of some soluble material. This was confirmed by Pasteur producing immunity from fowl cholera by inoculating with the sterilised products of the bacilli.

An interesting question is raised by the experiments of Hueppe and Wood, with the earth bacillus, which is morphologically identical with the anthrax bacillus, and cultivations of which, on inoculation into rabbits and mice, protected them from anthrax. Now the question is this, can one bacillus protect against the development of another? If so, then it must be assumed that the two, being so closely allied to each other morphologically, give rise to similar products, the earth bacillus forming a ptomaine analagous to the protective ptomaine of anthrax. Some assume, however, that the earth bacillus is simply the anthrax bacillus placed under such conditions that it has become attenuated and lost all its virulence, still retaining its protective power.

In other cases, it has been observed that certain organisms seem to exert an antagonistic effect on one another, thus, an animal inoculated with anthrax virus and blue pus products, passes successfully through the disease, the one virus antagonising the other, and modifying each other's effects, leaving the animal immune from anthrax. I will now give you a general outline of the methods of attenuation of virus.

Attenuation.—The virus used for inoculation may or may not be attenuated. When not attenuated, other conditions

are generally taken advantage of, which tend to modify its effects, but leave the animal immune; for instance, in pleuro-pneumonia, the effects are localised in the tail, there not being much constitutional disturbance; in other cases, it is introduced directly into the circulation, as in "black leg;" this seems also to have a modifying effect on its action, the protective power being, however, retained.

Briefly the methods of attenuation are as follows:—Heat.—Chauveau showed that the virus of anthrax was attenuated by heating to 50°C. for a quarter of an hour.

Exposure to air, as Pasteur employs in the attenuation of anthrax and rabies virus.

Passing through other animals; for instance, the virus of rabies is attenuated by passing through monkeys.

Treatment with various chemical reagents. Anthrax bacilli are attenuated by treatment with a five per cent. solution of carbolic acid, or a weak solution of corrosive sublimate.

The special methods used in each individual case will be referred to under each disease.

I will now take up the second part of my essay, viz., the consideration of the diseases in which inoculation has been practised with more or less success, at the same time asking you to bear in mind that, whereas inoculation against a certain disease might be successful in one country, yet in another circumstances might render it unnecessary, or even harmful.

VARIOLA.

Of the various forms of variola, human small-pox and variola ovina are the only ones we need consider, variola equina and vaccinia not being sufficiently virulent or prevalent to render inoculation against them, however successful it might be, necessary.

Small-Pox.—It may be said that this, not being a disease of the domesticated animals, should not have been introduced here; but when we consider that it is this disease which we have to thank for the introduction of inoculation, as well as vaccination, I think I need not apologise for including it.

But, as I have already referred to it at length in regard to the history of inoculation and vaccination, I shall now be as brief as possible. Suffice it to say that inoculation has been practised for several centuries, and that it has now been entirely supplanted by vaccination, which was introduced by Jenner in the latter part of last century. Before the advent of vaccination, inoculation was, however, performed with a

fair amount of success, and when we consider the ignorance of the times in which it was practised, and also of the people who practised it—for in many parts it was performed by old women, who, I should suppose, would be what at that time were called witches, I think we may say that in proving its success, it was working under great difficulties. In support of this, I may just refer you to the method I have already mentioned, which the Chinese had of making a paste of the pocks, wrapping it in cotton, and stuffing it into the nostrils; no wonder serious consequences often followed.

As to the length of time immunity is gained by inoculation, no correct observations seem to have been made; at the time when it was practised, it was supposed to give immunity for life, and as one attack of small-pox gives immunity for the rest of lifetime, it may be that the inoculated disease would do also; but as it has been entirely dropped since vaccination came into vogue, there is no chance of confirming it.

In vaccinating against small-pox, immunity is gained by the inoculation of an allied but milder disease, viz., cow-pox; but whether the cow-pox is due to a distinct but allied organism to that of small-pox, and which induces similar changes in the body, thus giving immunity against the more serious disease; or whether it is only another manifestation of the development of the same organism, assuming a milder form from some cause, I cannot say, for although the organism is known to be a micrococcus, yet it has not been much investigated.

It is not necessary for me to enter into any description of the operation of vaccination, with which you are all familiar.

Variola vaccinia having of late years become so uncommon and the demand for vaccine being so great, it is necessary that some method of cultivating the virus should be employed to supply all needs. This is done by inoculating a calf in a a number of places on its abdomen; it is then carefully watched, and when the vesicles are fully developed, the lymph is skilfully collected from them, the calf is then killed and a careful *post-mortem* examination made, and if any disease, such as tuberculosis, is found on it, then the lymph is not used. It is unnecessary to say that extreme care is taken in the cultivation and collection of this lymph, to ensure its purity. Most of the vaccine used by doctors is, however, that taken from the pustules of a vaccinated child; at first they may get a little calf lymph from the Government, but afterwards their stock is kept up by collecting the lymph from the children. There is no doubt whatever, that if properly carried out,

vaccination is a great boon, and with little or no danger to the patient confers immunity for a certain period, probably about seven years, and even after that if small-pox is contracted, it seems to be modified.

The great objection to it, however, arises rom the method of obtaining the virus from children; this would be all right if care were taken that none were used except from perfectly healthy children, free from hereditary disease; but if from want of care on the part of the vaccinator, lymph from a child, say, with tuberculosis or inherited syphilis, should be used, is it not very possible that vaccination might be the means of transmitting the disease to a healthy child? I think, therefore, that great care should be taken in collecting the lymph, only that being used which is taken from a patient who is not only healthy, but whose family is free from hereditary disease.

Variola Ovina.—Inoculation against sheep-pox, or ovination, is largely practised on the Continent, it being compulsory in Austria and Hungary.

It is found that, by passing sheep-pox virus through a number of sheep, it gradually becomes attenuated, but still retains its protective power. This attenuated virus induces a very mild form of the disease, and confers immunity. The seat generally selected for inoculation is either the tail, the inside of the thigh, or the inside of the ear. The virus is introduced under the skin by means of a fluted needle charged with virus; a vesicle forms at the seat of inoculation, and during its development there is slight fever and constitutional disturbance; it reaches its full development in about ten days.

The losses from inoculation are very small, as a rule, only 1 or 2 per cent., or even less; but the losses from the naturally induced disease may be 30 or 40 per cent. The great objection to it, however, is that the inoculated animal will transmit the disease to another, with all its original virulence; so that by inoculating you have constantly a source of contagion to other non-inoculated animals. For this reason it would be inadmissible in this country, where the disease does not exist, except when introduced from another country, which, luckily, is not often.

It would, however, no doubt be beneficial in countries where the disease already exists, or in dealing with an extensive outbreak of it. The question which suggests itself to me is, why should not vaccination be tried against this disease? If sheep-pox is a variolous affection, and allied to

to cow-pox and small-pox, why should not vaccination with cow-pox virus be as effective as it is in small pox? If it were successful, you would have a disease induced as mild or milder than that caused by ovination, without the danger of contagion which is present in the latter case.

Rinderpest.

A great number of experiments have been made in trying to discover a successful method of inoculating against rinderpest; all of them, however, have proved to be failures. It was tried in England as early as 1754, but the most conclusive experiments have been performed in Russia, where the disease is never absent.

Any of the fluids of the body, if inoculated into the animal, were found to transmit the disease; those which were most commonly used, were the discharge from the eyes or nostrils, the blood, or the discharge from the ulcers. It was found that if after inoculation the animal took the disease and recovered, then immunity was gained; but the objection to the operation was that so many died from the inoculated disease; the number of deaths varying at different times and with different experimenters, sometimes being as low as 2 or 3 per cent., at others as high as 75 per cent.

Attempts were next made to attenuate the virus, passing it through a number of oxen being first tried; but it was found that after it had been passed through ten animals it was as virulent as ever. Passing through sheep was next tried, but this also failed; and, lastly, the effect of preserving the virus was tried, but after keeping it for nine months it was found to have lost both its virulence and protective power.

Inoculation as a preventive of rinderpest has therefore proved to be of no avail; in fact, far from being beneficial, it is decidedly harmful, for the inoculated disease is communicable by re-inoculation and cohabitation to other animals; therefore by inoculating you would form a centre of infection from which the disease might spread.

I have no hesitation in saying, therefore, that immediate slaughter is the safest method of dealing with an outbreak of this disease.

I have already mentioned that, acting on the idea that rinderpest was allied to small-pox, vaccination was tried in the great outbreak in 1865; but I need scarcely say it proved a total failure, thus giving evidence against the theory of the variolous nature of the disease.

At some future time some method of attenuating the virus may be discovered, and then inoculation may be of avail; but in the present state of affairs it is worse than useless. Let us hope that in this country we may never again be visited by an outbreak of this terrible disease, which in former invasions has committed such awful ravages amongst our cattle.

Pleuro-Pneumonia Contagiosa.

We have now come to a very vexed subject, for, as you are well aware, inoculation against pleuro-pneumonia, as recommended by Principal Williams, Mr. Rutherford, and others, has found no favour in this country, at least with the Government, and perhaps not very general favour amongst practitioners. I think, however, that the experiments of Mr. Rutherford and others in this country, as well as those of inoculators on the Continent and in Australia, have proved conclusively its efficacy as a preventive measure. Scientific methods, however, find little favour with the Government of this country; it is not surprising, therefore, that they adhere to the old-fashioned but unscientific method of stamping-out by slaughter. It cannot be denied that this method has proved effectual, and that during the last few years the disease has almost entirely disappeared; but consider the enormous loss of healthy animals which are sacrificed by this method—animals which are only partly fed and unfit for the butcher, and which are therefore a dead loss to the country. Would not inoculation have eradicated the disease just as successfully, and without all this national loss?

In other countries, such as Australia, where the stamping-out method could not possibly be applied, inoculation has proved eminently successful. Time will not permit me to give you a detailed account of the operation and its consequences, I shall therefore describe it very briefly.

The virus used is the lymph collected from the interlobular lymph-spaces of a fresh lung, taken from an animal killed in the first stages of the disease. Great care should be exercised in the collection of the lymph, for no doubt the careless way in which some collect it accounts for their want of success; for instance, some squeeze out the frothy mucus, together with the lymph, and use this, the result being that septicæmia in many cases succeeds the operation.

Mr. Rutherford prefers the lymph to be fresh, but it should be at least one day old, as it is too virulent before that time. If it has to be kept for any length of time, it must be preserved in hermetically sealed tubes. The usual seat of

inoculation is the tip of the tail, the virus being introduced hypodermically, either with a syringe or soaked into a piece of worsted and inserted with a needle. The tip of the tail is preferred, because if gangrene occurs this organ can easily be amputated. After a successful inoculation, the characteristic appearances generally come on in four to seven days; similar changes are assumed to take place in the tail to those which take place in the lung in a natural case of pleuro-pneumonia, a protective power being developed which gives the animal immunity against the disease. Other operators introduce the virus directly into the circulation by intravenous injection, and this seems to be attended with great success, only slight febrile symptoms being developed and immunity gained. In this case some assume that a mild form of the disease is actually induced. When carefully carried out and the usual precautions taken, viz., good housing, and seeing that no diseased animal or cow near to or soon after calving is inoculated, then the losses from inoculation are very small, seldom more than one or two per cent., but the animals require to be carefully watched and examined regularly, so as to take necessary steps if unfavourable symptoms should develop. If large enough supplies of lymph cannot be obtained naturally, it may be cultivated by inoculating a calf behind the shoulder, where a swelling will form, and by puncturing which enough lymph will be obtained to inoculate a large number of animals.

I am rather surprised that attempts have not been made to attenuate the virus of this disease, for as it is now used, although attended with great success, yet the animals require careful attention; often amputation of the end of the tail has to be resorted to, and if the animal was not in good health before inoculation, serious symptoms are very apt to supervene; whereas if the virus could be attenuated, much of this might be obviated. To sum up, then, inoculation against pleuro-pneumonia is very successful, and is especially applicable in countries where extensive herds of cattle run wild on large tracts of land, and where it would be impossible to apply the stamping-out method.

(To be continued.)

ANTHRAX.*

BY G. E. GIBSON, M.R.C.V.S., FERRYHILL, DURHAM.

THE study of the disease known as Anthrax is of very great interest, not only to Veterinary Surgeons and the Medical profession, but to agriculturalists in general, owing to the great number of animals that fall victims to its ravages yearly throughout the world. As it would take up too much time to go into details of this disease in all animals, I purpose giving a short account of the forms affecting horses and cattle.

Synonyms.—Charbon (a term applied to denote blackness; as a coal), Glossanthrax, Splenic Fever, Splenic Apoplexy, Carbuncula Contagiose, Malignant Carbuncle, etc.

Anthrax is a malignant, specific, contagious, and some say infectious disease. But many outbreaks have occurred in our stable and not appeared in others at a very short distance away. And were it an infectious disease it would be much more epizootic in character. Yet the volatile contagion is recognised by many authors, including Zundel and Fleming.

It is a disease of extreme fatality and rapid development; affecting man and all animals, but more especially horses, cattle, and sheep. It is characterised by the presence of a micro-organism—the *Bacillus Anthracis*—which is found in the blood and tissues. It occurs as an enzootic or epizootic disease, and will attack animals in any condition, and at any age.

The period of incubation depends a great deal upon the activity of the virus, and to the individual predisposition of the animal; it may be from one or two hours to eight or ten days.

History.—The history of Anthrax can be traced back to a very remote period indeed. It was believed to be the disease known as the Fifth Plague, which is described in the Scriptures as affecting both man and beast in Egypt, at the time of the eightieth year in the life of Moses, during the reign of Pharaoh the Fourth, about 1500 B.C. But, considering what little would be known of veterinary science at that time, I think it will be sufficient for us to say that the microbe—the *Bacillus Anthracis*—was first discovered in 1849 by Pollender, and afterwards by Rayer, Wavaine, and Bradell.

Distribution.—This disease is now of rare occurrence among horses, especially in England. About four years ago there was an outbreak among the horses of the Carbineers in India,

* Read before the Edinburgh Veterinary Medical Society.

to which a great number of horses succumbed. It is universally distributed all over the globe, and is known in Siberia as "The Siberian Plague"; in Hindoostan as "The Loodianah Disease"; in Australia as "The Cumberland Disease," the latter more especially among shepherds. The most frequent outbreaks have occurred in low-lying fen districts, on black soil, where there is a quantity of decaying vegetable matter. The Lincolnshire fens are a good example.

Etiology.—The predisposing causes might be arranged as follows:—

1st. *Influence of Temperature.*—The disease generally breaks out in spring and summer, but most frequently in very warm weather; and, probably, this has something to do with the fact that the disease is more prevalent in warmer climates than in Great Britain. It occurs during sudden changes of the weather, alterations of heat and cold, with rain.

A good example is shown of the influence of temperature by Prof. Pasteur, who, by immersing fowls in water, and thus lowering their temperature, was able to inoculate them with the virus of Anthrax, though, when not immersed he was unable to do so. Fowls can also be inoculated after divesting them of their feathers.

2nd. Animals drinking stagnant water are more predisposed than those drinking pure water.

3rd. Wounds in the mouth or intestinal mucous membrane, or on any part of the body, predispose to the disease.

4th. Animals which are affected with any other disease, tuberculosis, for instance, are more liable to take on this disease than healthy animals.

5th. It is also more frequent in countries which are subjected to inundations of rivers.

6th. *Dietetic causes; especially in cattle and sheep.*—Sudden and violent changes in diet, as from a poor pasture to a highly nutritious one; and this is demonstrated by taking into consideration that every tissue in the body, by withdrawing from the blood those constituents essential to the life and growth of that issue, act as excretory organs to the rest of the body; therefore, without this withdrawal from the blood of those constituents, which occurs in animals changed from poor to very nutritious food, inasmuch as the blood contains more nutriment than the tissues require, these constituents soon become unfit for the purpose intended, and so become a *habitat* for organisms.

Contagion.—This is the exciting cause, and may be brought about in various ways—

1st. By actual contact with diseased animals.

2nd. The food, which may in some way have come in contact with diseased animals.

3rd. By grazing animals on pastures on which animals have died of Anthrax, and on which the discharge from the nostrils, and excreta, etc., which contain more or less blood, have been left, or near to which animals dead of the disease have been buried. Instances have been known in which carcases have propogated the disease after having been buried 10 or 12 years.

4th. The virus may be carried by flies, although the flies themselves resist it influence.

5th. It has been caused by animals feeding on imported food, more especially cotton cake; and this may be owing to the cake, in transit, coming in contact with skins or other things which have been associated with the disease, or, which is more likely, that the vegetable constituents of the cake have been grown on tainted ground.

The *susceptibility* of the intestinal mucous membrane of animals to infection varies very greatly. The guinea pig, which is very susceptible to the disease conveyed by inoculation through the skin, can take a large dose of spores into the stomach without sustaining ill effects, whilst cattle and sheep, both of which are more resistant as regards inoculation through the skin, are comparitively easily infected through the alimentary canal.

The *spontaneous origin* of Anthrax is not generally believed in, but it has been shown that by cultivating the virus downwards and downwards the bacillus becomes almost innocuous, and the fact that, by alternating the virus you alter its character, and it loses its virulence, which it quickly regains if cultivated again within the animal body. And Buchner, after a series of experiments, claimed that the hay bacillus, *Bacillus Subtilis*, can be transformed into the *Bacillus Anthracis*, if cultivated for several generations in meat extract. And also that the *Bacillus Anthracis* by the same process can be transformed into the *Bacillus Subtilis*. These results, however, have not been repeated, although general similar experiments have been made by other bacteriologists. But Heuppe and Wood, by using a species of earth bacillus as a vaccine, which, in its general characters and method of growth in nutrient media, appears to be almost identical with the *Bacillus Anthracis*, but which possesses no pathogenic properties, have rendered animals innocuous to the attack of Anthrax. This may account for the fact that im-

paired cotton cake will induce Splenic Apoplexy, by the transformation of the *Bacillus Subtilis* into the *Bacillus Anthracis.*

This opinion is also endorsed by an outbreak of Anthrax that occurred under my notice near Darlington on farms which were watered by a beck into which ran the outlet from a sewage farm. The water was far from being pure, being much impregnated with sewage, which was evidently not sufficiently drained in the land. The animals received their drinking water from this stream, and on one farm two cows died of Anthrax. In these case the predisposing cause would be previous disease, as both these cows were affected with tuberculosis. But one thing cannot be accounted for, and that is that the animals were bred upon the farm and had always drunk of the same water. Yet they were taken from that part of the farm and given pure water, and no more cases occurred.

Then on another farm, higher up the stream, a month afterwards four horses died of a blood disease I was told, but did not see them myself; however, these were not reported cases of Anthrax. About the same time, on a farm lower down the stream, some cattle also died of Anthrax, as did also two rabbits which were experimentally fed upon bran mixed with some water from this stream, one in five days, the other in nine days.

Anthrax had never before been known in the district, and in the first case no fresh importations of cattle or food had been made.

These cases were, in my opinion, due to the transformation of organisms into the *Bacillus Anthracis.*

Pathology.—Anthrax is due to the *Bacillus Anthracis*, which gains entrance to the body by the alimentary canal, the respiratory tracts, or by external wounds.

The *Bacillus Anthracis* is a parasitic fungus, and consists of straight rods joined end to end with blunt slightly curved extremities; it is motionless, and multiplies by division in the animal body, but in a suitable culture material with a plentiful supply of oxygen and a temperature between 77° F. and 89° F., they grow into very long filaments, and in these spores from at regular distances and appear like peas in a pod.

The filaments break up and the spores are set free; these, under favourable circumstances, grow into bacilli. The bacilli are $\frac{1}{5000}$ inch to $\frac{1}{1250}$ inch in length and $\frac{1}{25000}$ inch in breadth. They are surrounded by an outer case or sheath in which is protoplasm. The bacilli may be separated by

filtration, and a cover glass preparation can be made by employing a quarter per cent. watery solution of gentian violet or fuschin, or a saturated watery solution of methylene blue, leaving it in contact for half or three-quarters of a minute, then rapidly washing off dry, and mount in Canada Balsam.

To test the blood in suspicious cases take a drop of blood from the spleen and spread it on a cover glass and set aside to dry for a few minutes, then examine under one microscope and there will be seen lying between the red corpuscles a number of short rods of the size above mentioned if the animal has died of anthrax. The bacilli can only live at certain temperatures. Their growth is arrested at 5° C. (41° F.). 280° F. kills them in three hours.

Action of Chemical Agents.—Antiseptics hinder their growth, but do not destroy them. Disinfectants kill them, corrosive sublimate 1 to 1,000, or carbolic acid 10 per cent. solution will kill the spores. They require moisture and they also need oxygen, they are therefore called aërobic.

Great numbers of the bacilli leave the body in the urine, fæces, and blood flowing from the mouth, nose and anus before the animal dies.

According to Professor Koch, in carcases buried at a depth of six feet below the surface oxygen and a suitable temperature are wanting so no development of spores occur and the bacilli soon die. According to that theory, Professor Pasteur's belief that the spores do develop under these circumstances, and are brought to the surface by earth-worms, is erroneous.

I would suggest that animals having contracted the disease after grazing over anthrax graves have taken into their system spores which have remained on the surface when the animals were buried, as it is a well known fact that spores will live for an indefinite period with moisture and oxygen. The bacilli destroy life by acting as asphyxiants, depriving the blood of its oxygen, and by mechanically obstructing the blood vessels. They multiply very rapidly and are easily cultivated outside the body. In consequence of this the *Bacillus Anthracis* was the first organism that was proved definitely to be associated with specific disease. When pregnant animals become affected the fœtus does not contract the disease, the fœtal membranes acting as a filter to the blood.

Varieties.

1st. Splenic Apoplexy, Anthrax Fever, or Splenic Fever. This is the internal form without external manifestation.

2nd. Symptomatic Anthrax, as Gloss-Anthrax, Anthracoid Angina, the form with external tumours.

Anthrax Fever in the Horse.

Rarely met with in this country, is very prevalent in India.

Symptoms of internal form without external tumours. This is much more fatal than the external or symptomatic form, that being accounted for by there being no external tumours to get rid of the morbid material. The symptoms appear suddenly. There are first noticed violent muscular tremors, the animal sweats freely, difficult and irregular breathing, loss of control of the muscular movements, more especially of the hind limbs. The animal staggers and dies in convulsions.

The symptoms may not, however, be so rapidly developed. They may begin with dulness, with a small weak dicrotinous pulse; the extremities are cold, and perspiration appears on different parts of the body; the temperature is high—104° F. to 106° F.; the conjunctival membranes are injected, swollen, and dark red in colour; the breath is fœtid; superficial lymphatics swollen; the animal exhibits signs of colicky pains; the skin is harsh and dry; there is sometimes crepilus over the region of the hips; and the animal dies in twelve or fourteen hours.

Symptoms with localization.—These consist, in addition to the foregoing symptoms, in the development of tumours in the interstices of muscles, in the loose areolar tissue, and in the lymphatic glands, generally in the submaillary space and upper part of the throat; also behind the shoulders and along the back and loins. The tumours generally appear as large, soft, crepitating, undefined swellings; as they extend they become cold and insensible, and vesicles appear on the surface. If manipulated, crepitations may be felt, which are due to the evolution of gas from the decomposing tissues, causing emphysema. As the tumour develops the urgent symptoms vanish, and in some cases the tumours are absorbed; then there are profuse sweats and diarrhœa, and the animal rapidly recovers.

Gloss-Anthrax.—With this section might be classed Gloss Anthrax, in which disease the tumours are replaced by vesicles on the sides, dorsum, and frænum of the tongue, and buccal membrane of the mouth and lips. These vesicles vary in size, and contain a yellowish serum, which becomes almost black in colour, is corrosive and acrid, destroys the tissues round about it, and forms an ulcer. The tongue swells, hangs from the mouth, and becomes almost black in

colour, showing the ulcers with red centres and black margins. These ulcers discharge a pus-like liquid, which is mixed with blood and saliva. The swelling often extends to the throat, forming the lesion known as Anthracoid Angina, and the animals die of suffocation. This disease generally proves fatal in twelve to twenty-four hours.

Splenic Apoplexy in Cattle.

Symptoms are very analagous to those in Splenic Fever in the horse. The animal ceases to feed and chew its cud; there are rigors and stiff and unsteady gait; control is lost over the limbs, which are rigid and stiff, and the animal falls to the ground exhausted. The pulse is very rapid and feeble, and the temperature raised several degrees. A tenacious fluid oozes from the mouth; discharge of liquid and blood-stained excreta from the arms; blood flows from the nostrils; the eyes sink into the orbits, and tears flow down the face; tympanitis ensues, and emphysema of the skin along the back and loins. The animal sometimes dies in an incredibly short space of time, as an old farrier, with whom I was acquainted, often told me, "the first symptom of Anthrax is death." This is true in some cases, but not in all, as the animal may live for two or three days. The local lesions are principally confined to the spleen, and to a less extent the liver and intestines; sometimes, however, the lungs may be affected.

Symptomatic Anthrax and Gloss-Anthrax are very similar to the same conditions already described in the horse.

Quarter Evil, or Carbuncula Emphysema Erysipelas, has been described as Symptomatic Anthrax, but it has not been distinguished as a different malady. It is not due to the *bacillus anthracis*, as is proved by it not being communicable by inoculation into the blood. But it is undoubtedly due to a microbe in the form of a large bacillus, but which has the power of movement.

Post-mortem Examination of Animals which have died of Anthrax.

In making autopsies of animals which have succumbed to Anthrax great precaution should be taken by the veterinary surgeon. If he has any cuts about his hands or arms he should not attempt handling the carcase. In any case, gloves should be worn and the hand and arms smeared with a good disinfectant, and as tobacco smoke is a germicide it would be advisable to smoke, as so many persons have died of Anthrax from accidental inoculation.

In the first place, the carcase rapidly decomposes after death, and in a very short time the carcase becomes tumefied and swollen from the excessive formation of gas in the areolar tissues and tympanitis. Serum is seen oozing from the nose, mouth and rectum, and the latter is often protruding and black. On cutting the skin crepitation is noticed from the disengaged gas and black liquid blood escapes. On places where tumours exist the skin is detached and black and consequently deteriorated in value. The muscular system is impregnated with black blood, and the muscles are easily detached from the bones, and on the engorgements there appears to have been no inflammation. The large blood vessels are filled with fluid blood, which gives no signs of coagulation and the walls of the vessels are red in colour. The heart is soft and flabby, and contains liquid blood in its cavities. The pleura and peritoneum are irregularly covered with spots or ecchymoses, and sometimes tumours are found in the mesentery. The tumours are formed of masses of black blood of a gelatinous consistency, and are principally situated near the kidneys. The spleen is three or four times larger in volume than usual, and is often found to be ruptured; the pulp is broken down, and the organ is full of black liquid blood. The liver is enlarged and friable. The coverings of the brain present black spots. The blood throughout the body is thick and black, and presents a tarry appearance. The thickness is due to the effusion of the serum into the tissues, and the blackness is attributable to carbonic acid poisoning.

Treatment.—Very little good can be done in treating any form of Anthrax if the symptoms are fully developed. Recovery may, however, take place in a small number of cases.

Locally, the tumours are to be fomented with hot water and cauterized with crude carbolic acid or any strong disinfectant, and give internally chlorate of potassium dr. iii three times a day, or give dr. i of acid carbolic two or three times a day. Sodium hyposulphite has been given with success, but Principal Williams is of opinion that its antiseptic action is only on the contents of the intestinal canal. Diuretics might also be given, but purgatives do harm by causing irritation in the already congested mucous membrane. In the convalescent stages give tonics, sulphate of iron in dr. ii doses daily, or nux vomica dr. i daily. In 1871 the disease, about which not much was known pathologically among ordinary practitioners, was treated with bleeding, saline purgatives and exercise, and in very rare cases the animals recovered.

But the prevention and arrest of the progress of the malady is of much more importance than the treatment.

Prevention.

If animals are to be slaughtered it is advisable that they should be shot, and, if possible, burnt at once. If this is not possible, then they should be conveyed to a quarry, plantation, or spinney—in fact, any place not used for pasturage or tillage, and which is below the water supply of other animals. The skin should be left on, and the carcase buried in lime six feet below the surface. Care should be taken to convey any litter, excreta, etc., and have it buried with the carcase. If the animals have been in a stable or byre this should be thoroughly cleansed and disinfected. The same precautions should be taken with the implements which have been used. The walls should be washed with lime and carbolic acid, and sulphur might be burnt in the place, which should be left untenanted for three or four weeks. If the animals have died on a pasture, it should, if wet, be thoroughly drained and receive a covering of quicklime. All animals ought to be kept out of it for a time, or inoculated by one of the methods to be described. And it is advisable to give the other animals on the farm dr i. doses of chlorate of potassium daily.

Police Regulations.—The Local Authority should at once be aquainted when an outbreak takes place. They employ the Veterinary Inspector and supervise the slaughter, if any is necessary, and disposal of the carcases of the animals dead.

Inoculation.

For the inoculation of Anthrax the first and most important thing to be done is the cultivation and attenuation of the virus.

The best method of cultivation of the *Anthrax bacillus* is to take a drop of Anthrax blood and sow it on a sterilised potato. The potato is sterilised by the following method. It is first scrubbed with a hard brush under a stream of water. It is then left in a solution of corrosive sublimate 1 to 1000 for an hour or so; then with a knife which has been rendered sterile by passing it through a flame, a quadrilateral piece is cut out of the centre and rapidly transferred to a glass capsule previously sterilised by heat. The capsule with the contained potato is next placed in a steam steriliser, and on the first day is steamed for three-quarters of an hour and on two succeeding days from ten to fifteen minutes.

The steam steriliser is a large metal cylinder, about six or

eight inches from the bottom of which is a large metal grating; on this rests a tin vessel with a perforated bottom and lid. The cylinder below the grating is filled with water heated by a Bunsen lamp. The capsule containing the material to be sterilised is placed in the tin vessel and introduced into the cylinder when the water is boiling. These capsules are plugged with baked cotton wool, which intercepts the entrance of germs by filtering the air which passes through.

The blood is sown upon the potato and allowed to grow there for several days, at almost 85° F., until spores are well developed; then triturate a small quantity of the growth with distilled water, and place a number of silk threads which have been previously sterilised by heat, in this mixture; dry them carefully, cut into short lengths, and keep in a plugged test tube. From these threads cultivations may be made in almost any artificial nutrient medium. In addition to this infusion, starchy materials, vegetable, hay, or meat infusions, or sterilised alkaline urine, may be used.

Attenuation.

First, Pasteur's method of attenuation by heat. By this method we are able to attenuate the virus of Anthrax (speaking figuratively) almost to a hair's breadth. In fact, it can be made so that it will not affect a guinea pig a week old, yet one a day old will succumb to the same preparation. The secret of this discovery, and it is recognised as one of the greatest scientific discoveries ever made, was the verification of pre-conceived ideas by actual experiment, but these ideas were subjected to the severe control of experimentation.

The bacillus is cultivated at a temperature between 42° and 43° C. (or 107$\frac{3}{5}$° to 108$\frac{2}{5}$° F.). This is done in an incubator, which consists of a double-walled chamber, with water interposed between the walls, the temperature being kept constant by a gas flame and regulated by a thermostat.

By being kept at this temperature the virus daily loses its virulence, until by the ninth day it becomes inert to cattle and sheep. This virus, though inert, is, nevertheless, a true vaccine, as it confers immunity against the attack of an uncultivated virus. The system of inoculation consists of employing two strengths of this attenuated vaccine. The first after fifteen or twenty days cultivation; the second after ten or twelve days cultivation, and a period of twelve or fifteen days elapsing between the administration of the two vaccines.

The inoculation is made with the ordinary hypodermic syringe used by veterinary surgeons, which should be clean and free from germs, and care must be taken that air is not sucked in with the fluid to be inoculated.

Sheep are inoculated inside the thigh; horses on the neck; cattle behind the shoulder. The second inoculation is performed on the opposite side of the body. If the first inoculation has not been properly performed, the second one may kill the animal. The best method of inoculating horses is twice with the first vaccine and once with the second.

Experiments by Professor Toussaint led to the discovery that sheep and rabbits were protected by injecting beneath the skin anthrax blood deprived of the bacilli by heat, filtration or by antiseptic drugs. He preferred heating fresh blood from a diseased animal to 131° F. for ten minutes, adding to it one half per cent. of carbolic acid. A small quantity of this when inoculated gave rise to slight fever for three or four days, which subsided on the fifth day.

Dr. Klein advocates the use of vaccine, the virulence of which has been destroyed by corrosive sublimate. He has shown that one part to 25,000 parts of water will, in about fifteen minutes, prevent the bacilli producing virulent Anthrax in sheep.

In conclusion, I will quote a few experiments which Pasteur made with the attenuated virus in France in 1881.

In the first experiment, ten cows and fifty sheep were obtained; six cows to be inoculated, four not; twenty-five sheep to be inoculated, twenty-five not; the whole to be afterwards inoculated with the uncultivated virus.

The twenty-five sheep and six cows were each inoculated with five drops of the cultivated vaccine; twelve days afterwards they were re-inoculated with a stronger cultivated vaccine and again twelve days after this all the animals were inoculated with the uncultivated virus. Two days afterwards, of the twenty-five sheep not protected, twenty-one were dead and two dying, and the others certain to die that evening. The non-protected cows were all suffering from intense fever and so weak that they could not eat. They presented great swellings where they had been inoculated with the crude virus. The protected sheep were healthy and lively, and the cows did not exhibit the slightest disturbance, and no tumours at the seat of inoculation.

I think that is sufficient proof of the efficacy of the inoculation against Anthrax.

QUITTOR.

BY W. BRYDEN, VETERINARY SURGEON, BOSTON, U.S.A.

THE VETERINARY JOURNAL for September, 1893, contains the last of a synopsis of Professor Macqueen's article on Quittor, read by him before the Midland Counties Veterinary Medical Association, England. Its completion in the journal was awaited with the interest and expectation one waits for what a popular teacher has to say when the subject reviewed is ill understood by the profession, and often difficult to treat satisfactorily in practice.

From ten to twelve years ago I engaged in a controversy with members of the teaching and hospital staffs of the "American" Veterinary College, New York, on the subject of Quittor, but dropped the controversy as my contention did not appear to be understood. I beg to submit, therefore, that I am somewhat disappointed to find Professor Macqueen still practically taking the side I then opposed,* and in this he was not only sustained, but endorsed and applauded by all present at the meeting where his article was read and discussed.

Judging from my own practical experience with true Quittor, I beg your permission, and also Professor Macqueen's, to state that I regret the fact that the confusing of Quittor and a number of other diseases, thought to resemble it, has been most unfortunate, some of them being the result of accidental and other injuries, the ætiology and therapeutics of which are entirely different from one another. The confusion seems largely to prevail in Europe as well as in America. Pathology regarded in this general way loses its significance and never can lead to anything but confusion of the student, and illogical treatment of the patient; never to that professional progress demanded by earnest friends of the veterinary surgeon who dare *to think* for themselves. From the evidence before us, veterinary practice in this respect in 1893 is little, if any, in advance of the days of Markham and Solleysel.

Professor Gamgee, in his "Diseases of our Domestic Animals," seems to me to have had a truer conception of the ætiology of Quittor than any of the veterinary authors I have chanced to read so far.

* *Vide* "American Veterinary Review," p. 373, November, 1881; p. 479, January, 1882; p. 531, February, 1882; and pp. 572, 573, 575, 577, March, 1882.

In presuming to take the positive stand I do with reference to what I have (rightly or wrongly) called the physiopathological class of diseases of the horse's feet, legs, and other parts, I beg to explain, especially to practitioners like myself, who have only received the ordinary veterinary education of some twenty-five years ago, that although I may not describe the many interesting phenomena and adverse tissue changes taking place within a part like the hoof, in the limb, and in the "horny box" itself, with the exactness of a trained pathologist, yet I can state in all candour that my observations are the result of actual experience in practice—one of more than ordinary proportions—during a period of over twenty years, and embracing never fewer than from 500 to 1,000 street railroad horses, in addition to a mixed practice among all kinds of horses and cattle, larger than the average number. Pardon my making the foregoing remarks about my practice, and also for suggesting that one of the most important features of any diseased condition to the student is to have a proper appreciation of its ætiology (its history), from the first adverse tissue change. When the hoof, from unfavourable conditions, begins to change (all or in part) in form, size, or quality, and to crowd and encroach on the sub-horny, sub-coronary, and other structures that secrete and nourish healthy tissues, or that renew and repair such as have become degraded and imperfect, even to those that are the deepest seated, lining the nutrient foramen, &c.; so deep-seated, indeed, that no operation that is safe and practicable could possibly reach, or that Nature could renew or repair, in less than the average time which she demands to remove such defective tissues, and reproduce or transform into new. These adverse changes (degenerations) having been going on for perhaps a year or more, and having involved the whole quarter of its inner recesses, Nature finally rebels, and a swelling with lameness and some discharge appears at the quarter coronet. This is true Quittor. In my experience such a sinus could no more be cured in a month, or even hastened, than an egg could be hatched by some patent incubator in one-eighth, one-quarter, or one-half of the time it could be done by an old hen. Such a Quittor could no more be cured in a month than a case of seedy-toe that had undermined the wall to within an inch of the coronet could be repaired in a month. These are prerogatives of old Nature that she never tolerates being trifled with or coaxed from her control, not even by a bluff operation. I contend, therefore, that what is claimed to be excision of the cartilage

has no more to do with the cure of Quittor than punctured wounds of the foot or treads on the quarter have in causing Quittor. I mean true Quittor, which cannot be cured by excision until after Tom, Dick, and Harry have treated it for over six months. Then some operator pretends to cut it out, charges a large fee, and it gets well in a month or so. He also gets the credit for a cure that he has no right to. The fact of the matter is that it has then, as it were, "run out," and would have got well in common course in spite of his interference. It could not then be prevented from getting well, unless complicated by some unusual interference, sometimes called surgery, heroic surgery—a very bastard surgery, too, I consider such work.

The other cases that get well after an operation are those said to be caused by treads and accidents which could not possibly cause True Quittor, not even by a coincidence. How could it? The early history of the case is entirely inconsistent and incompatible; the adverse changes in the tissues of the quarter have not prepared it for this form of disease.

Let us take, for example, a case in which, from a defective coronet, the coffin bone has become adversely affected, the cartilaginous elements of the pedal articulation being most involved; the process or function of "selection and appropriation" has not been properly performed, and in the disturbed state of the parts this cartilage element has been transplanted or transferred by the circulation to the wings of the os pedis; such a piece of cartilage might be pared off with impunity, but this is uncalled for patchwork, and quite another affair from a case in which the quarter is all degenerated—a change that has been going on perhaps for months or years.

During the early adverse tissue changes of True Quittor the disease can be arrested, but not after the sinus has opened in the usual way; then an average period of over seven-and-a-half months is demanded, according to my experience and philosophy; then also a cure can be guaranteed and so can the time required to effect it be predicted with almost unvarying exactness. These are facts that can be demonstrated in every case.

What will the pathologist of the future think of the veterinarians who flourished in 1893, and who could not discriminate between fistulæ, sinuses of the foot, the different sinuses of the withers, or the different sinuses of the poll? Their different ætiologies have not been considered separately, but have been all, in each case, mixed together and an average struck. Of what use are such averages? It never

seems to have occurred to practitioners that cases like these, or that cases like so-called Navicular Disease, and cases of Disease of the Navicular Bone were entirely different things. In August, 1292, I was called to a finely-bred mare due to foal last spring; she had a faulty gait -she was a "paddler" —but carried her master some three miles to the station once or twice daily till November. She developed, in August, a condition of the withers which indicated fistula, and which it finally proved to be. I ordered this not to be opened until "fly time" was past A flax-seed poultice, made with 5 per cent. solution of carbolic acid, was put in a thin bag and attached under the front of an old thin blanket every night; an abscess-like swelling soon organized, which I opened by drawing tapes through it in November. In a short time it was entirely cured. Her foal came along in due course, and she was again ready for service by the horse—a very vigorous young one.

Immediately after, I was again notified that the mare had another Fistula. Instead of True Fistula, which it resembled, however, it proved to be the result of an accident, the stallion having bitten the withers when serving her. This recovered in about three or four weeks from the fact that it was merely a simple wound to tissues that were healthy when bitten. Then, again, we have all seen cases in which from the fact that the feet having become tender, and the muscles, ligaments and other tissues of the shoulders having become gradually changed from sympathy or otherwise, the dorsal spines become injured when lying down or rolling against the wall or floor from repeated bruises or other cause; tardy healing sores are the result.

Almost a similar class of cases is found in connection with Poll Evil, which could not all have come from a simple blow, as formerly taught.

Sincerely hoping that my remarks will offend no one, for they are only intended to stimulate investigation in newer lines, to train the eyes that they may see differently and more accurately, to cultivate our powers of observation, that we may be better able to interpret Nature's laws in health and disease and be able to discriminate between the different tissue changes, and know the history of such changes, from the very beginning, then can we hope logically to predict the result of treatment, and the time required to accomplish cure or repair most successfully.

Editorial.

PAINFUL AND PAINLESS LAMENESSES.

THERE seems to be an idea entertained by unskilled persons that all animals manifesting lameness—which may be considered irregularity, more or less continuous, in the normal gait—are suffering pain, and that the lameness is the expression of that uncomfortable feeling. And prompted by this idea, and acting from, no doubt, a most laudable motive, steps are often taken by some of these unenlightened people to prevent all lame animals, and especially horses, from working because they are presumed to be tortured thereby. In the Police Courts such cases are frequently brought before the magistrates, and generally the individuals who caused such animals to be worked are punished by fine or imprisonment. There can be no doubt whatever that in some of these cases an injustice is perpetrated, and innocent people have to submit to penalties—often very heavy—through the mistaken notion that every limping horse must necessarily be in suffering when compelled to travel. There are lamenesses in animals, as in man, which are not accompanied by pain or suffering of any kind, the painful stage of the accident or disease, which primarily occasioned them, having been passed probably months or years. It undoubtedly requires special knowledge to arrive at this decision, but it is none the less a fact that a horse may appear to be very lame, and, perhaps, have a deformed or visibly damaged limb, and yet feel nothing more than inconvenience in movement owing to mechanical impediment. At the same time, it is well to remember that what has been designated a mechanical lameness, may be a very painful one; for instance, a recent dislocation of a joint will cause a mechanical hindrance to movement, and give rise to most painful sensations; but if the dislocation is not reduced, then anchylosis may take place, and, after a time, the pain will disappear, and nothing but lameness remain. The same thing may occur with regard to tendons and some other casualties: animals may appear lame, and yet there is no evidence whatever that they are experiencing the slightest pain in movement.

The kindly but mistaken feeling which prompts humane though uninstructed people to intervene on behalf of such horses, and to have those who work them punished for cruelty, only needs leading in another direction by suggesting

that, in seeking to impose penalties on the drivers or owners of these horses, cruelty to mankind is inflicted.

The expert well knows that horses suffering pain express their feeling in, to him, an unmistakeable manner? and it is, therefore, a question for the expert to decide as to whether a lame horse is undergoing such suffering.

We have observed with regret a tendency on the part of certain magistrates at times to ignore expert evidence, and to assume the functions, and venture to express themselves as experts. This is not the *rôle* of the dispensers of justice, and when they place themselves in a false position, their opinions are worth no more than any other amateurs Their duty is to receive evidence, and administer the law according to that evidence, and it is nothing less than impertinent presumption when they put expert evidence on one side, and, unskilled, themselves undertake the function of the skilled witness.

A lameness may be accompanied by pain, or it may not—that is, it may be painful or painless—and those who have made a special study of animal diseases and accidents, and consider it the business of their life to abolish pain, should be in the best position to state whether a horse or other creature is suffering or is free from pain.

The use of the expression "Mechanical lameness," to denote a painless lameness, should, we venture to suggest, be discontinued, as it is erroneous, and does not convey to ordinary people a true sense of what it is intended to imply. Painful and painless are terms which are really understandable, and at once indicate what the expert would wish to express in regard to lameness. A mechanical lameness might or might not be attended with more or less pain.

THE TRANSMISSION OF MICRO-ORGANISMS BY MEANS OF MILK.

BY DR. FRANZ HAUIGMANN, BRESLAU.

THE question whether carriers of contagion may be secreted in the milk of animals, is one of extraordinary interest, and has led to many researches, especially in relation to cows' milk. The fact that the taking of the milk of diseased animals may produce disease was known before bacteriological researches were made. We find, especially frequent in medical literature, accounts of stomatitis in consequence of eating unboiled cows' milk from animals affected with foot-and-mouth disease.

As early as 1865 to 1870, experimental researches were made concerning the virulence of the milk of animals fatally diseased with inflammation of the spleen, and murrain. Bollinger seems to have been the first who determined through experiments the virulence of the milk of cows suffering from anthrax; while nearly ten years before, Gerlach succeeded by a longer feeding of his

test animals with the milk of murrain-diseased cows, in producing tuberculosis. The same observations were made later by Bollinger, Klebs, Gunther, and Harms, by similar experiments; and Feser produced splenitis by subcutaneous inoculation with the milk of sheep suffering from anthrax, while Manotzkow was unable to find bacteria in the milk of animals suffering from splenitis produced by inoculation, neither could he obtain any result by feeding or subcutaneous injections of this milk in lambs. Chambrelent and Moussou were, however, able to establish the presence of bacilli of the characteristic thread-shape form in the milk of a sheep suffering from splenitis, as the result of inoculation, which died 21 hours after inoculation. In the same case, the milk of the sheep proved to be virulent, as was clearly shown by the inoculation of guinea-pigs. Pernice and Scagliosi obtained a secretion of the bacilli in milk by the intravenous injection of guinea-pigs with the *bacillus anthracis*, although in seven similar experiments a negative result was obtained.

Besides the above experiments, experimental researches have been made by Semmer, Peuch, and Toussaint, but Peuch alone obtained a positive result.

After the discovery of the bacillus tuberculosis, feeding experiments were supplemented by experiments with inoculation. May injected under the skin and in the peritoneal cavity of guinea-pigs, milk of cows diseased with murrain, but in only one case, in which there was disease of the udder, did he obtain a positive result. Bange was more successful in his experiments, securing a positive result in every case. He was also able to demonstrate the presence of tubercle bacilli in the milk of cows. In these cases, however, the udder was found to be completely sound in but one instance. Stein found the milk of cows diseased with murrain virulent in only 4 out of 14 cases of intra-peritoneal injection. Bange was more successful in his experiments. He mainly considered the question whether disease of the udder be necessary or not, in order to produce the transmission of tubercle bacilli. He found that milk from the sound parts of the udder, as well as from diseased parts, in cases of udder tuberculosis, was capable of producing tuberculosis when fed to animals. He also found that the milk of tuberculous animals, without tuberculosis of the udder, sometimes contained bacilli, and was virulent, and sometimes was free from bacilli and not infectious. The same experimenter subsequently injected the peritoneal cavity of rabbits with milk of 28 tuberculous cows without udder disease, but produced tuberculosis only twice. Similarly, the milk of eight tuberculous women proved to be non-infectious when tested by inoculation.

Recently, Hirschberger has published a work treating of the infectiousness of milk of diseased cows. Pure milk not contaminated with blood was taken, with septic precautions, in some instances from the udder of slaughtered animals by means of a Pravaz syringe, and sometimes being obtained before killing the animal. With this milk guinea-pigs were inoculated intra-peritoneally. The milk was found to be virulent in 11 out of 20 cases, the animals suffering from miliary tuberculosis of the peritoneum, spleen, and liver. Tubercle bacilli were found only once in the milk, the udder being at the same time diseased with tuberculosis. Positive results were also obtained in cases in which the udder was wholly sound.

In the same year, Ernst made similar researches and experiments with 36 tuberculous cows presenting no symptom of udder disease. In 114 examinations of milk taken from different cows, the microscopical evidence of tubercle bacilli was found in only 17 cases. Inoculation experiments with rabbits and guinea-pigs showed the milk to be infectious in 28.57 per cent. of the cases.

From this brief summary, it is clearly shown that tubercular and splenitic bacilli may be transmitted through the milk of animals affected with these diseases.

Some other experiments have been made for the purpose of determining whether bacteria are capable of passing from the blood into the secretion of the mammary glands. Wissokowitsch injected rabbits with cultures of *Micrococcus tetragenes* and *Bacillus cuniculicida*, but was not able to prove in either case the existence of bacteria in the milk. Pernice and Scagliosi, however, obtained, in four cases, by injection of a bitch with *Staphylococcus pyogenes aureus*, and of guinea-pigs with *Bacillus anthracis* and *Bacillus subtilis*, a secretion of the injected microbes through the milk, while other experiments entirely failed.

Finally, I wish to mention some cases in which milk has been found to contain bacteria without the possibility of the transmission of the germs from the blood of an animal into the secretion of the mammary glands. Krueger, who examined bacteriologically the milk of a cow diseased with inflammation of the udder, and suspected also of murrain, found neither tubercle bacilli nor other micro-organisms peculiar to milk, but a cluster of cocci, from which, by inoculation, the cultures proved to be *Staphylococcus pyogenes aureus*. Krueger, therefore, charges the latter with being the cause of the inflammation of the udder. Furthermore, Lehmann reported, at the 17th Assembly of the German Society of Public Hygiene, experiments by which it was proved that cows' milk contains germs which have found their way into the udder, and especially those parts which were first deprived of their contents. Leopold Schulz, who, at Lehmann's suggestion, made researches relating to the origin of milk bacteria, found that after thorough disinfection of the udder, and of the hands of the milker with sublimate, followed by washing with sterilized water, one c. cm. of the milk contained from 200,000 to 400,000 microbes. He investigated, further, whether this great number of microbes could not be explained by the supposition that the germs accumulated in the ducts of the mammary glands, and proved by separate examination of the first and last portion of the milk, that very great difference in the number of fungi was observable. Similar experiments have been made with the goat, with the same result.—*Zeitschrift für Hygiene und Infectiones Krankheiten.*

TREATMENT OF ACTINOMYCOSIS BY POTASSIUM IODIDE.

THE success attending the treatment of actinomycosis in man and animals by potassium iodide, first introduced by our distinguished colleague, Professor Thomassen, of the Utrecht Veterinary School, is now frequently recorded; and there can be no doubt that this drug has a wonderful effect on the fungus and the mischief it produces. Among the more recent and notable instances of its successful effect may be mentioned the three cases described by Perinni, in the *Oesterreichische Monatschrift für Thierhalkunde*. Two of the animals were cows. The first had the disease in the tongue, and that organ was so swollen that the animal's mouth remained open. There were several sores on the tongue, and the submaxillary lymphatic glands were suppurating. The prehension of solids and fluids was very difficult, and mastication was all but impossible. There was no fever. The treatment consisted in the daily administration of ten grammes of potassium iodide in two doses, and given in a pint of water. From the third day a marked improvement was manifest, and after fifteen days Perinni noticed that the lingual engorgement and wounds had disappeared, and the tongue had regained its normal size, while the adenitis had also subsided, consequently masticaaion could be performed with the greatest ease. No relapse occurred.

The second cow, though it had been affected for a longer time than the other, did not offer such notable lesions, which were of the same character, and in the same region, as the other cow. The same treatment was adopted, and recovery followed in eight days.

The third case was a young ox, which was affected with actinomycosis of the jaw in an early stage. Ten days' treatment with the potassium iodide resulted in a perfect cure.

INFLUENCE OF THE MILDEW OF CEREALS ON THE HEALTH OF THE DOMESTIC ANIMALS.

PROFESSOR PUSCH, of the Dresden Veterinary School, has made a large number of experiments with the view of determining the influence of mildewed cereals on the health of animals, and to ascertain the action of the gastric juice on the vitality of the spores of *tilletia caries*. From these experiments he believes himself justified in formulating the following conclusions:—

1. The horse, ox, sheep, goat, and pig, may for a long time ingest large quantities of the spores of mildew of cereals without any injury to their health.
2. The mouse, sparrow, and fowl may succumb to hæmorrhagic gastro-enteritis if they receive a large dosage of mildew.
3. Pregnant guinea-pigs and cows may abort after consuming mildewed grain, but they must receive very great quantities of the parasite.
4. The spores, when deposited on the conjunctive or on the respiratory mucous membrane, do not cause inflammation.
5. The power of germination of the spores is suspended, but not destroyed, during their passage through the digestive canal, except in the fowl, in which this faculty is definitely suppressed.
6. The cause that hinders the germination of the spores is the high temperature of the body.—*Deutsche Zeitschrift für Thiermedicin.*

CONTAGIOUS DISEASES AMONG THE DOMESTIC ANIMALS IN JAPAN.

IN the *Archiv für Wissenschaftliche und Praktische Thierheilkunde* for 1893 (Sept. 3-5) Professor Janson, of the Tokio Veterinary School, gives an interesting account of the domestic animals in Japan, and makes allusion to the contagious diseases prevailing among them.

It appears that the first official sanitary reports began to be issued in 1873, but complete statistical reports were not published until 1877 in that country. From these reports it is concluded that although certain contagious maladies, such as strangles and rabies, have been present for a very long time, yet there are others which have been recently introduced: these are bovine tuberculosis, porcine pneumo-enteritis, and fowl-cholera, which have only been seen in Japan since the opening of the ports to the world. A number of contagious diseases are still unknown, such as bovine contagious pleuro-pneumonia, aphthous fever, symptomatic anthrax, actinomycosis, the various forms of influenza, horse-syphilis, swine erysipelas, sheep-pox, and horse and sheep scabies.

The *cattle-plague* was seen for the first time in 1871; in 1873, 42,297 animals perished from it in the western portions of the country, and it lingered in certain districts until 1876. In 1891 it reappeared, being introduced by slaughter cattle from the Corea; but the invasion was limited, and from October 29th to December 24th only 2,875 cattle died or were killed as infected.

It is stated that this scourge prevails permanently in the kingdom of Siam, whence a great number of cattle are exported to Southern Asia, and consequently the contagion is carried with them everywhere.

Bacteridian or *symptomatic anthrax* only exists in the south-west of the principal island; and Jaudon states that in 1879 it caused great destruction among horses, cattle, and sheep. In 1886, 300 horses were attacked in one day in the Saitama district. The north of the chief island and the large islands of Yesso and Shikoku are still free from anthrax.

Glanders prevailed in Japan before the opening of the ports, but it was confined to a few districts only. Tradition has it that it was imported long ago by the numerous Persian horses introduced by the Japanese nobles into their studs. The disorder remained stationary during the feudal times, in consequence of the absolute isolation of the different principalities, and it was only when the new political organization was established, and the interior frontiers abolished, that the disease began to extend. Glanders has also been detected on several occasions among horses imported from America, China, and Cochin China. Farcy appears to be the most common manifestation, and is very wide-spread. In one district alone—Miyagi—it is estimated that one-third per cent. of the horses are affected with it, though it would seem that some other cutaneous diseases are mistaken for it. A law passed in 1886 ordains that all glandered animals are to be destroyed, but it is not rigidly enforced.

Rabies is present in Japan, and was known for a long time before the ports were opened. In 1886 it prevailed in a very serious manner in the capital—Tokio—and a number of people died from hydrophobia.

Tuberculosis is very frequent in mankind, but it has never been witnessed among the native cattle, though it is largely manifest among those imported into the country, and especially in the short-horns, Devons, Ayrshires, Americans, and their crossings with the indigenous breed. According to the abbatoir statistics, fifty per cent. of the American cattle and their crossings are tuberculous. Tuberculosis is extremely frequent among monkeys.

The *pneumo-enteritis* of the pig was imported with American breeding-swine in 1873, and is now prevalent throughout the country.

Among the other contagions diseases in Japan may be mentioned *strangles*—which does not appear to be common—*gangrenous coryza*, and *epizootic abortion*; the latter is only known among the exotic and crossed breeds of cattle, and has not been observed to attack the native stock. *Fowl-cholera* also causes considerable losses every year.

ECHINOCOCCOSIS OF THE UDDER IN A COW.

THERE are very few organs which may not be invaded by Echinococci, but if human medicine offers a considerable number of observations of echinococcosis of the mammæ, no notice of this condition has yet been recorded in bovine pathology. The following case, reported in the *Berliner Thieraertzliche Wochenschrift* for October last, by Veterinary-Surgeon Rehmet, of Cologne, merits attention for that reason.

The carcase of a cow, aged eight years, was seized by the sanitary authorities because of extensive tuberculosis of the pleura and peritonem. The mammæ were relatively small, and were normal in appearance externally, but in passing the hand over them numerous hard nodules were felt which were suspected to be of a tuberculous nature. When an incision was made into the organ, however, it was discovered that the hard masses were really echinococci full of limpid serum, the majority of them being the size of a hazel nut; each was single, and lodged in a distinct cyst. Some of them were as large as a hen's egg, and their interior was divided into secondary cavities, communicating with each other. In some of these cysts the mother vesicle was surrounded by daughter vesicles, so as to give the appearance of a bunch of grapes. Although the majority of these echinococci contained secondary vesicles, the scolices (suckers and hooks) were absent, or at most there were only noticed here and there aborted scolices, the suckers of which were scarcely formed, and the hooks alone could be traced.

An interesting point to note is that the tissue of the udder had not undergone any perceptible alteration, even in the vicinity of the hydatids; there was neither atrophy of the gland substance nor hypertrophy of the connective tissue

of the organ. It is also to be remarked that no echinococci were found in any other part of the carcase, neither in the lungs or liver.—*Revue Vétérinaire.*

CONTAGIOUS PLEURO-PNEUMONIA AND CANADIAN CATTLE.

It is stated that Mr. Adams, Professor of Pathology at McGill University, Montreal, and late Fellow of Jesus College, Cambridge, and Dr. McEachran, the Dominion Veterinary Inspector, have made a microscopical examination of the lungs of an animal landed from the steamer *Huron* and slaughtered at Deptford, which was alleged to have been affected with contagious pleuro-pneumonia. They have sent separate reports to the Canadian Government upon the results of their examination, and both agree that the diagnosis of the English veterinary authorities was based upon serious error, and that the condemned animals were not suffering from that disease.

DR. CHAUVEAU AND THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

It gives us great pleasure to observe that the Council of the Royal Agricultural Society of England, on the occasion of a vacancy having occurred among its honorary members, through the death of Monsieur Edouard Michel Leconteux—one of the chief founders and first secretary of the *Société des Agriculteurs de France*—have elected our esteemed and very learned colleague, Professor Auguste Chauveau, M.D., LL.D., Inspector-General of the Veterinary Schools of France, to be an honorary member. This honour has been conferred in recognition of his distinguished services to veterinary science as applied to agriculture. The Society could not have made a better or a more worthy selection, and in bestowing this well-merited honour on Dr. Chauveau, it honours itself and the interests it represents. We most heartily felicitate the new honorary member of the Society on this, and not the least, addition to the many marks of recognition which have been offered him since he began to enrich science and make his name famous among the *savants* of this century.

KING'S COLLEGE (LONDON) COMPARATIVE PATHOLOGY AND BACTERIOLOGY CLASSES.

These classes continue to be held for instruction in comparative pathology, histology and bacteriology, they and the excellent laboratory of the College affording every facility for obtaining a practical knowledge of these subjects, as well as for prosecuting original research in all matters relating to the micro-pathology of the diseases of man and animals.

A special evening class in general bacteriology for those who cannot conveniently attend during the day commences on January 22nd and continues until March, being held on Mondays from 7 to 9 o'clock, the course consisting of lectures and practical work in which the students examine, stain and mount examples of the various micro-organisms from cultures and in tissue sections.

There is also a post-graduate course of instruction in the same subjects, beginning in January and continuing to March. Members of the veterinary profession in and around London have ample opportunity now offered them to resume or complete their studies in these important branches of medical knowledge, and should they be desirous of availing themselves of it they ought immediately to apply to Professor Crookshank or Dr. Hewlett, King's College, London.

Army Veterinary Department.

Gazette, November 28th.

VETERINARY-LIEUT.-COLONEL F. WALKER is placed on retired pay. Veterinary-Major A. E. Queripel to be Veterinary-Lieut.-Colonel, vice F. Walker. A. H. Lane, gent., to be Veterinary-Lieutenant, in succession to Veterinary-Lieut.-Colonel F. Walker.

Gazette, December 19th.

Veterinary-Lieutenant J. A. Braddell to be Veterinary-Captain.

The Queen has approved of the retirement from the Service of the undermentioned officer:—

MADRAS VETERINARY ESTABLISHMENT.—Veterinary-Lieutenant-Colonel F. G. Shaw. Dated 1st October, 1893.

Veterinary-Captain C. Rutherford embarked on November 25th for a tour of service in India, and Veterinary-Major W. Walker embarked on December 2nd to complete his period of service in that country.

Veterinary-Lieutenant W. R. Walker has been transferred from the Indian establishment and posted to Woolwich for duty. Veterinary-Lieutenant A. J. Haslam, M.B., arrived from India on November 29th, and has been posted to Dublin for duty.

Veterinary-Major W. Burt, having attained the age of 55 years, has been placed on retired pay. Veterinary-Major W. Walker has been restored to full pay. Veterinary-Lieut.-Colonel F. Walker, Inspecting Veterinary Officer, Eastern Circle, Bengal, having attained 55 years, is placed on retired pay; and Mr. Lane, M.R.C.V.S., has been commissioned a Veterinary-Lieutenant in his place.

Veterinary-Captain L. J. Blenkinsop, attached to the 10th Royal Hussars at Cahir, has sustained a rather severe accident in a fracture of the right fibula. Veterinary-Lieutenant W. A. McDougall has therefore been transferred from Newbridge to Cahir for duty with that regiment.

The following transfers of Veterinary Officers have taken place: Veterinary-Major S. M. Wilson, from Woolwich to Exeter; Veterinary-Captain R. H. Ringe, from Exeter to Aldershot; Veterinary-Captain J. B. Savage, from Aldershot to Canterbury; Veterinary-Major J. Hammond, from Canterbury to Chatham; Veterinary-Major B. A. W. Powell, from Chatham to Dorchester.

Obituary.

THE death of Mr. J. Caldecott, M.R.C.V.S., Knutsford, Cheshire, has been reported. He graduated so lately as 1889. Mr. Sangster, M.R.C.V.S., of Long Lane, West Smithfield, London, died on November 28th, aged 67 years. He became a member of the Royal College of Veterinary Surgeons in 1861.

Parliamentary Intelligence.

HOUSE OF COMMONS, December 5th, 1893.

IRISH AGRICULTURE.

Mr. FIELD asked the First Lord of the Treasury whether it was the intention of the Government at an early date to establish a Board of Agriculture for Ireland, and a Veterinary College in Dublin.

Mr. GLADSTONE: The Government at the present time have no proposals to make on the subject, but the Irish Government have received suggestions in favour of it, and will be glad to find some appropriate opportunity of considering some plan for the purpose of giving effect to it.

December 14th.

SWINE FEVER.

Mr. FELLOWES asked the President of the Board of Agriculture what was the number of outbreaks of swine fever which had occurred since the Act came into operation on November 1st; whether he was aware that large numbers of pigs were now being imported from Ireland into England, and that Ireland was rife with the disease at present; and what restrictions were imposed by the Board on the movements of pigs in Great Britain.

Mr. GARDNER: Up to the end of last week swine fever had been ascertained to exist on 350 sets of premises since the recent Act came into operation. With regard to the imposition of restrictions on movement, I am well aware of the value of such measures in preventing the spread and distribution of disease, but until we have obtained complete information as to the localities in which it centres we cannot take any action in this direction without giving rise to more inconvenience and loss than we could justify. We have, however, kept on foot the various restrictions on movement imposed by the local authorities prior to November 1st last; and with regard to Ireland I may remind the hon. member that similar efforts are being made to stamp out the disease in that country as we are making here, and the facts before me do not warrant the belief that the disease is so rife there as to render it necessary for us to interfere at the present time with the large and important trade in swine between the two countries.

Proceedings of Veterinary Medical Societies, etc.

MIDLAND COUNTIES VETERINARY MEDICAL ASSOCIATION.

A MEETING of the above was held at the Bell Hotel, Derby, on November 14th, the president (T. H. Merrick, Esq., of Northampton) occupying the chair. There were also present, F. W. Wragg, Esq. (president R.C.V.S.), Capt. Russell, Messrs. Olver, Trigger, Green, Gooch, Huband, W. Carless, Malcolm, Kenyon, Abell, Coe, junr., Smith, Bayley, S. W. Martin, Rossell, etc.

It was announced that the Hon. Secretary (H. J. Dawes, Esq., of West Bromwich) was unable to be present through indisposition, and in his regrettable absence Mr. Malcolm officiated in the capacity.

Letters regretting inability to be present were received from Sir Henry Simpson, Professors McCall, M'Fadyean and Macqueen, Dr. Fleming, Messrs. Dawes, Blakeway, Perrins, Hodgkinson, Grasby, Barling, W. S. Carless, and Crowhurst.

Mr. John Thomas Abell, of Derby, and Mr. Alex. E. Bayley, Matlock Green, were nominated.

The PRESIDENT then proposed, in accordance with a notice contained on the agenda, that Professor Macqueen, of London, be elected an honorary associate of the Association.

Mr. MALCOLM seconded, and observed that if they could only get Prof. Macqueen with their Association it would greatly add to the interest of their discussions.

The motion was unanimously carried.

On the motion of Mr. WRAGG, seconded by Mr. HUBAND, it was resolved that the treasurer be authorised to pay outstanding accounts to the 31st December next.

Mr. T. H. HUBAND then read the following

"FOOT NOTES."

Mr. President and Gentlemen,—One of the chief objects of such an Association as this is that there should be a free interchange of ideas and

experiences to the mutual benefit of its members, and sometimes it happens that one of the least qualified and unpromising of its number is requested by the presiding genius to read a paper upon something or other, with a view to obtain from the more able and better experienced of members much invaluable information which would otherwise remain unknown to the profession. Such is my position to-day, and in selecting "Foot Notes" as key notes, I hope they will prove effectual in producing harmonious and profitable discussion; for if I can only provide the right notes, doubtless everyone present will have something to tell us upon so commonplace a subject. My short experience of these meetings leads me to think that very often the consideration of these matters—apparently too simple in character to be worth while reviewing before men who may have fathomed every depth of scientific research in all subjects appertaining to their professional work—has proved most useful to the busy practitioner, and resulted in benefit of a practical and permanent kind to our members.

Without further apology for the simplicity of my subject, which although very comprehensive has also the advantage of being compressible, I should mention that my first notes will be upon the General Management of Feet, commencing with a few observations upon the foal's foot, without at any time professing to throw any new light on the subject or to put forward any novel principles of management, but I shall particularly endeavour to introduce such points upon which some diversity of opinion exists, with the view to correcting errors of my friends or of my own as the case may be.

The Foot of the Foal.

At birth this is one of the most remarkable, and at the same time one of the most beautifully arranged structures with which nature presents us. Instead of its lower or plantar surface being conclave, as in the adult foot, it is supplied with several leaf-like appendages, in structure much resembliug soft leather, growing from the part upon which the frog is afterwards formed, while the parts which ultimately become known as the sole are covered with substance much resembling soft cartilage, which becomes thicker upon reaching the lower margin of the wall to which it becomes united, a depressed line marking the point of union all around; while it will also be observed that this bulbous structure is partly divided in places by small clefts or fissures.

Professor Brown, in a little work on the foot, recently published says, "In the hoof of the foal the fibres of horn at the bottom of the foot are continued to a point, the fibres being joined together, not unlike a half-cleaned paint brush. No frog or bars or crust can be seen, but after a few days' contact with the ground the brush-like masses of horn fibre are broken off, and the sole becomes flat or slightly hollow, but never presents the deeply concave form until it has been brought under the knife of the shoeing-smith."

After careful examinations I cannot quite corroborate the above writer's statement as to the early changes which occur to the young foot just subsequent to birth. I have searched in vain to find where "the fibres of horn continue to a point," have become worn away or broken off. Upon examining the foot within a few days of birth it is seen that the soft protuding masses upon the sole which at birth projected beyond the margins of the horn-fibres of the wall have disappeared as if by collapse and contraction, permitting the before mentioned marginal border of the wall to reach the ground, thus forming the outside border of the planter surface, and giving the parts within this border a condition of slight concavity in forming the sole, while the more loosely connected, longer pointed, leather-like appendages before described, have been drawn together in a beautiful arrangement to form the frog. For some days afterwards no cohesion may occur between these frog-forming appendages quite to their terminal parts, but after a fortnight I have found it

difficult to distinguish marks of division. Nature's primary design in thus providing the fœtal foot with soft pad-like structures is doubtless protective, since the hoof even at birth is tolerably hard, and otherwise might be a cause of much injury during the act of parturition, but I think other reasons exist to excite our admiration of nature's beneficent intent, by further arranging that some of these soft, protecting structures shall quickly become non-existent when they have served their purpose, while other portions arrange themselves to form an organ which is of vital importance to preserve the foot through life.

Development of the Foot.

Most proprietors of large breeding establishments of racing stock are fully alive to the importance of supplying conditions under which the feet of their youngsters shall have every chance of proper development, paddocks of sound old turf on a dry porous subsoil, well shaded and yet well watered, with careful housing in roomy loose boxes, on comfortable dry straw beds, surroundings are provided under which nature seldom fails to supply this valuable stock with such feet as in all probability will never, unless afterwards abused, give the animals or their owners any cause of trouble. And I would like to remark in this place that many of us might often prevent much evil by a friendly hint to our farmer clients as to these facts. I find that with many small breeders the last consideration very frequently is the condition and care of the feet of their young horses. Many times I have seen promising two and three-year-olds with ragged, split feet, and growing into all shapes but the right, when the most simple early attention would have averted disease or deformity. Instances are easily forthcoming as to the influences of surrounding conditions upon foot development:—place two foals at birth under quite opposite conditions, each having good feet, the one upon wet meadows where its feet are seldom or never upon firm ground, the other upon dry uplands: the first changes just described proceed slowly in the former case, and at weaning time from the meadow you have flat, soft, weak-soled feet, while upon the uplands they have grown a good shape, tough and durable in texture.

We read that upwards of twenty-two centuries ago the renowned Xenophon insisted upon the importance of horses having good feet, since he wrote "Incerta basis unstabile ædificium" and through all time since the truth of this statement has never been denied, and in our time is daily confirmed, although usually in the more familiar terms, "no foot, no horse," being perhaps the most common interpretation of the sentence. "No foot"—how frequently in our daily work we hear or use the expression, and how comes it that throughout these ages of progress and improvement, horses have no better feet than did those of thousands of years ago. The responsibility for this state of things rests to a great extent with the breeders and their advisers, and we as a body are looked upon as the educated advisers referred to; but as a matter of fact we are seldom consulted in such matters, and when we are, the advice given is often silently ignored. With the breeder, particularly of racing stock, the commercial consideration often outweighs all others, as he asks himself the question, "what matters it to me, so that I can provide a combination of the fashionable strains to suit public taste, and obtain a good average for my yearlings?" although he is well aware by so doing he will reproduce, probably in an aggravated form, defects or conditions which it would be vastly better to take all pains to eradicate. At the same time, I have generally found less difficulty as an adviser in such instances where it has been a case of bad feet than with most of the other hereditary conditions, and a sire which is known to have navicular disease, club-foot, ring-bone, side-bone and such like affections, is generally tabooed by breeders, whilst it is well known that many horses and mares leave the turf for the stud with thoroughly sound feet but subsequently acquire disease from neglect or mismanagement.

Unfortunately, hereditary predisposition, unsuitable conditions for development, and neglect of the young, are but a few of the common causes in the production of "no foot." In many instances no evil is wrought until the shoeing-smith begins his work.

When the first horse-shoe was forged, and by whom, is, I believe, unknown; and whether Homer, who wrote some time about a thousand years before the Christian era, about "the brazen-footed steeds," meant that the horses had hoofs like brass, or that they were shod with brass, is uncertain, but since he also wrote, "beneath the armed hoofs of clatt'ring steed," I think it must be inferred that the feet had protecting armour of some kind.

Dr. Fleming, in his work upon "Horse-shoes and Horse-shoeing," gives Xenophon credit for the first mention of garniture for the feet as "sandals," and says that Aristotle was the only Greek writer before the Christian era who referred to any defence of the kind for the feet of animals; which were made of raw hide or coarse cloth, and used for camels.

Fleming states it as his opinion that "metallic badges of servile subjection were unknown to the ancient Greeks, and that the first reference to the subject subsequent to the Christian era was by Arrian (A.D. 200), who in comparing the human body to a pack-ass, mentioned a kind of shoe for that animal. It is recorded that Nero (about A.D. 60) had his mules shod with silver, but they are supposed to have been the sandal-like shoes. Whether the Barbaric races who overthrew the Roman Empire introduced the art of nailing shoes to horses' feet, as is maintained by many eminent authorities, whether it was a common practice in the days of Charlemagne, or not until the beginning of the Capet dynasty, although of great interest and importance to antiquarians and archæologists, matters little to busy veterinarians. Whether the Romano-Frankish or the Gallo-Roman specimen shoe at the British Museum is the more ancient is unimportant to us, but that their similarity to shoes of our time is very marked is a matter upon which we may with advantage reflect.

How Shoeing is carried on at the present time.

Many of us have no doubt witnessed the process of preparing a good foot for its first shoe. With a strong drawing knife, assisted by the hammer at its back, the lower parts of the wall are taken off, the sole pared out until the desired concavity is obtained, not forgetting to remove as much as possible of the bars also. Next the heels are "opened out" by cutting a deep notch out of the wall on either side of the frog, excising at the same time the remaining get-at-able portions of the bars, then with a few bold master strokes the frog is "trimmed," which often means sliced away from heels to point, then it may be thought best to shorten the toe before exchanging the knife for the rasp, which is vigorously applied from all available directions in levelling down the foot. When sufficient energy has been expended, and the operator is satisfied with the finish made by the file-parts of the tool, the foot is taken forward first upon one and then the other of his knees while the whole exterior surface of the wall is filed down evenly and thoroughly and its lower edges are smoothed off. Next the chosen plate of iron shaped like a shoe is placed upon the foot, and if the latter still appears a trifle too large for its accommodation, further parings or raspings, or perhaps both are had recourse to. After cutting out a piece of the toe for the reception of the clip, the next proceeding is to heat the iron to such a degree as his particular notion pronounces the best for "fitting it on." This is generally the dull red condition, taken from the fire it is fixed for handling by driving a pritchel into one of the nail holes, and carried upon this it is again placed upon the foot, and the smith endeavours by blowing away the thick fumes which arise under his nose to see the points of contact between horn and iron, and applies extra pressure upon those parts where horn seems to have a little the best of it.

When all offending portions have been thus burned down, the iron well-cooled instrument of destruction is lifted off, the well-cooked, blackened, dried-up horn, most of the charred remains are removed with the knife (but in some instances the processes of heating and burning, etc., are repeated), and the well-satisfied mechanic is proudly conscious that he has obtained a level bearing. After further cooling, "back holing" filing up and otherwise embellishing, the plate of iron is nailed upon what remains of the hoof. When the nails have been hammered up and clinched a second filing is often thought necessary, and some very fastidious workmen are not satisfied until they have given the external surfaces a good rubbing down with emery cloth. After some blackened oil has been smeared all over the hoof, the operation is deemed satisfactorily finished, and the foot presents such an appearance as most dealers in horses delight to see.

In other instances the foot has to be subjected to an extremely opposite course of preparations for shoeing, and the operator is forbidden to use the drawing knife under any circumstances whatever, which is certainly carrying the non-interference principle too far, since, although sufficient of the walls and bars may be removed with the rasp, the use of the knife is requisite to detach the partly desquamated portions of the sole, as well as useless ragged pieces of the frog, beneath which offensive matter would otherwise accumulate, and which is not removed even by washing out the feet in the ordinary hurried manner, whilst if remaining it acts injuriously upon the sound horn which lies in contact with it. Other horse-owners insist upon cold fitting.

Practice dictates a middle course between these extreme systems; always favouring strictly conservative principles; opposing a free use of the knife (particularly upon the frog), and a long continued application of the hot shoe in fitting. A skilful smith finds it only necessary to lightly apply it at a bright red heat to afford him all the indications he requires as to its fit, and this is by no means injurious to the horn, possibly beneficial, and certainly results in better adaptation of iron to horn than the method of fitting cold. The burning-into-place system cannot be too strongly condemned: what physiology teaches as to the removal of moisture from organized structures is particularly true in respect to the hoof:—"The importance of moisture as a constituent may be shown in a striking manner by its withdrawal. If any tissue be subjected to heat sufficient to drive off the greater part of its water, all its characteristic physical properties are destroyed, and what wa previously elastic and flexible becomes hard and brittle." (Kirk). Even though horn is a slow conductor of heat it cannot be doubted that those portions which are contiguons to what is burned out of the way have their characteristic physical properties impaired if not destroyed. Rasping the outsides of the wall and thereby removing the varnish-like periople should not be permitted. The skill of the smith is his ability to provide a perfectiy level resting-place for a perfectly level shoe which he has prepared for this, and in ordinary cases this can be done entirely with the rasp, the toe of the foot always requiring to be rasped more than the quarters in order to maintain a correct natural obliquity of the foot upon the ground, and which is of the utmost importance to observe—by these means so much only of the horn is removed as the growth of the protected foot (by the shoe) demands.

Some Extracts from the Works of Ancient and Modern Writers on the Subject.

The oldest work I have which is devoted to veterinary work and the farrier's art is "Markham's Masterpiece," published in 1717. A few extracts from the chapter on foot management may be amusing if not very instructive.

"Markham's Masterpiece" (1717) *General observations for the feet and*

hoofs of a horse.—"Forasmuch as the feet and hoofs of a horse are the only instruments of labour, and that a small grief in that part deprives a man of the benefit and use of the rest, I think it not amiss to show you some general notes and observations which you shall observe for the benefit of the feet. Know then that first it is meet that you let your shoes before be rather too short than too long, with strong spunges but no cawkins, and your nails to have special good heads. Let your shoes behind have no cawkins on the outside, but if he interfere let the cawkins be on the inside to make him cast outward, and let the inside of that side inward have a welt an inch deep, or be twice as thick as the outside; but if all this help not his enterfering then bring him into an amble, but if he will not amble then burn him with a hot iron between the legs, that the soreness thereof may make him go wide behind, which is an ordinary practice amongst the Italians and Frenchmen. Give unto every shoe nine nails, on each side four and one in the midst, and let the shanks of the nails be very flat and thin, that if the hoof be naught they may yet keep the shoe firm with little hold; and the nearer that your nails are driven backwards towards the heel (so it be without danger) the faster the shoe will fit. In fair ways pare the sole thin, but in frost or stony ways, pare as little as may be."

"Edward Coleman (1798) on Paring the Frog."—"The horny frog if not contracted or raised above the ground is seldom or ever hard or inelastic, for where the external frog has been much exposed to pressure from below its internal cavity is preserved, expanded, and no lateral pressure is given to the sides of the sensible frog, but when the internal cavity of the horny frog becomes diminished, the sides of the sensible frog become squeezed and inflamed. In proportion to the degree of inflammation of the sensible frog, the external frog is heated, and from this morbid accumulation of heat the horny frog soon becomes dry and inelastic. It is not consistent with the wisdom and laws of nature that she should have formed an organ elastic in its structure, and placed in a situation much exposed to pressure, if that pressure had been pernicious and altered its original formation."

Prof. Bouley, the most eminent French veterinarian, has more recently written:—

"The art of the farrier ought to be to preserve to the hoof the integrity of its form essentially allied to that of its functions, and this result can only be obtained by leaving to the bars, the buttresses (angles formed by the bars and wall), the frog and sole all their powers of resistance, in protecting them without interfering with their action, their contact with the ground, their suppleness or their natural flexibility."

Prof. Fred Smith says, "Physiological Shoeing" consists in:—

(1.) The reduction of the wall to its proper proportions such as would have occurred through friction had no shoe been worn.

(2.) Fitting the shoe accurately to the outline of the foot, not altering the latter to fit the shoe. Rasping away the crust to fit the shoe not only renders horn brittle but is so much loss of bearing surface.

(3.) Leaving the wall intact, so far as its varnish-like layer is concerned. The practice of rasping the wall for appearance sake destroys the horn tubes, and allows of so much evaporation from the surface of the foot that the wall becomes brittle.

(4.) The sole not to be touched with the knife; it cannot be too thick, it is there for the purpose of protection.

(5.) The bars not to be cut away; they are part of the wall and intended to carry weight. The shoe should rest on them.

(6.) The frog to be uncut and left to attain its full growth, which can only occur through resting on the ground. No frog can perform its functions unless on a level with the ground surface of the shoe.

(7.) The pattern of the shoe is immaterial so long as it has a true and level bearing, and rests well and firmly on the wall and bars. The simpler the shoe the better, viz., one plain on both ground and foot surfaces, to be secured with no more nails than necessary, as the nails destroy the horn, and these are not to be driven higher than needful, for high nailing is ruinous to feet."

Professor Brown sums up in very few words:—"The basis of the art of shoeing is the principle of non-interference, and it is not easy to carry this principle far."

(To be continued.)

SOUTHERN COUNTIES VETERINARY MEDICAL ASSOCIATION.

THE autumn meeting of the Association was held at the Royal College of Veterinary Surgeons, Red Lion Square, Holborn, on November 7th, Mr. J. F. Simpson, President, in the chair.

The following gentlemen regretted their inability to attend the meeting: Sir Henry Simpson, Dr. Fleming, Professor Penberthy, Mr. C. Pack (secretary), and Mr. Alston Edgar.

Discussion on "Mechanical Lameness in Horses."

Mr. W. HUNTING said: I should like to say at the commencement that I have not written a paper on this subject, although it has been announced that I should read one. The reason is not because of any disrespect to the Society, but because the subject was chosen for me by your President, and such short notice given that I had no time to write a paper. I think, however, that it is a subject which we can discuss very well without a paper, and I, therefore, simply propose to open the discussion.

The title "Mechanical Lameness," requires very little explanation to an assembly of veterinarians. I purpose, however, to attempt a definition, because once or twice lately, I have heard magistrates dispute its existence. The late Mr. Montagu Williams distinctly told a veterinary surgeon one day: "If a horse is lame he is suffering pain—the very fact of his being lame shows he is suffering pain." Another magistrate recently expressed the opinion that contracted tendons must be painful, and he said that if the whole Royal College of Veterinary Surgeons attended before him and said they were not he would not believe them.

In the human body we know that lameness may exist without pain; a man may have a stiff knee or ankle and he is lame simply because he cannot move his joints, and I do not think there is much imagination required to assume that the same thing happens with the horse, and that if there is mechanical interference with the movement of a joint—an essential joint in locomotion—there must be lameness. This is no new thing. I find in Percival, who wrote in 1849, a distinct recognition of mechanical lameness, although he does not use that word. He says, "It is pain that commonly produces lameness; inability in one form or another in the absence of pain will, however, be found as a proximate cause of lameness. The dislocation of the patella occasions no pain, and yet the horse is too lame even to move; the partial or complete ankylosis of a joint may cease to be attended with pain, and yet there may be permanent or irremovable lameness." Those illustrations are almost enough to show even an unprofessional man what is meant by "mechanical lameness." Of course it is extremely difficult if you enter into a metaphysical argument to prove that a horse does or does not suffer pain; you can only argue by analogy

but, I think, considering that the structure of the nervous system of the horse is so identical with that of man, we have a perfect right to conclude that what holds in the human subject holds in the animal. Although it is very easy in a book or on paper to divide lameness into painful and non-painful, or mechanical and non-mechanical, practically each case presents difficulties, because the mechanical lameness that exists may be the effect of a previous painful lameness which has passed off. Take, for instance, any long continued painful condition of the foot. The result is that the horse from pain rests that foot and in resting it he flexes the joints, and if you keep joints flexed for any length of time the tendons and white fibrous tissues contract and suit themselves to the fresh angles of the bones. If, for instance, you have a horse suffering from slight corns for many months, from navicular disease long continued, or from fever in the feet long continued, the certain effect of it is that he will go forward in the knees, and you may try all you can to extend those knees, either under chloroform or after death, and you will find it impossible. Why? If the knees were simply bent from pain in the feet you would be able, when the pain passed away, by physical force to straighten the knee; but you find you cannot do so, either after death or during insensibility when under chloroform, because the white fibrous structures, the tendons, have shortened themselves to suit this new angle of the bone. The tendons must be a perfectly definite length in relation to the angles of the bones upon which they act. It is the same with the string of a bow; if you wish to have a bow act perfectly, your string must be taut—it is no use trying to use a bow if the string is slack. If a bow were bent more than usual and retained that extra bend, the string which previously fitted exactly would be slack, and you have a mechanical condition rendering the action of the bow imperfect. It is precisely the same with the bones, ligaments, and tendons of animals. Immediately you alter the proper normal angle, the tendons passively contract so that they may meet the new condition of things and be taut, because unless the tendon is taut the muscle cannot act with proper effect. Not only, then, may a painful lameness cause a mechanical alteration in the bones, but the painful lameness may pass away and leave a mechanical deformity, and that mechanical deformity may cause lameness. If, for instance, both knees of a horse be shot forward, and the angles of the bones altered in that way, he will hardly go lame. When both legs are affected he will go "groggy" and shuffling, but not what the majority of people would call lame; but if one leg is affected and not the other he inevitably goes lame: there must be a halt in the action because the two legs practically are of a different length from the body to the ground. A greater practical difficulty arises in these cases when you have a mechanical lameness and a painful lameness at the same time. We will take as an illustration of that the ordinary ringbone. When a ringbone has advanced so far as to unite the two bones together—the small and large pastern—as soon as that joint becomes ankylosed you have a mechanical impediment to motion. It does not follow that ringbones are painless; on the contrary, nearly all ringbones are painful up to a certain stage, and it is only when the inflammatory process settles down and leaves the painless ring of bone that you have a purely mechanical lameness. But this is not an easy point to determine in practice; it is very difficult to say always whether the lameness of a ringbone is simply due to the mechanical ankylosis of the joint or to ankylosis accompanied by pain. Again, you have this complex lameness in some cases of navicular disease. A horse suffering from navicular disease for any length of time gets his knees forward and the pasterns straightened, it may be to such an extent that the pasterns are what is called "shot." When you have a bent knee and a shot pastern in connection with navicular disease, you have a painful lameness accompanied by a mechanical lameness. Another condition not uncommon

is where you have had sprains of the metatarsal ligaments at the back of the leg just below the seat of curb. Of course, while that sprain is recent there is pain, and lameness due to pain; but I find that those cases hardly ever resume their normal condition, the leg seldom gets right entirely. The usual thing is that when the horse goes sound and the acute symptoms subside you have some shortening of the tendons at the back of the leg, the result being that the heel is raised from the ground and the horse goes on the toe. I have also noticed that when a horse once goes on the toe there is a tendency for the deformity to increase, and accordingly, as that horse remains at work, the heel becomes raised more and more from the ground until the horse is utterly unable to get the heel down, even when you raise the other foot. The very fact of a horse going entirely upon the toe of one foot, and on the heel and toe combined of the other renders him lame, and I hold that unless some distinct symptoms of pain can be recognised, this conditition is simply and solely mechanical lameness. Again, in a case of chronic lymphangitis, or any other condition which causes a very great amount of swelling of the leg implicating one or more joints, and thus interfering with flexion or extension of the joint, you have a mechanical lameness. Of course in the early chronic stages of lymphangitis there is great pain, but in the chronic state I think that the lameness which is left is merely the result of mechanical interference, due to organised lymph—to use an old pathological expression—filling the subcutaneous tissues and causing adhesion of the skin to other parts. Spavin is another condition of that I should like to refer to. A horse suffers from spavin, by which I mean disease of the bones of the hock—we will put it widely—and in the early stages where you have exostosis upon the bones or in all stages where there is articular ulceration you have pain. Even in simple cases of exostosis such as splints, pressure upon the periosteum during growth causes a great amount of pain, and during the growth of spavin you may have distinct pain from a similar cause and a painful lameness. If spavin lameness continue for any length of time—I mean by that some months—you nearly always have contraction of the tendons at the back of the leg, with the result that the heel is raised from the ground and the toe takes all the pressure. Even in a mild case, before any noticeable contraction of tendons, you will find the wear of the shoe at the toe indicating an extra amount of pressure, due to the fact that the tendons behind are commencing to contract and that the horse does not rest the heel firmly on the ground. Now, in a case where you have a spavined hock, a shot fetlock, and the heel raised from the ground it is not easy to say whether that horse is suffering from a mechanical lameness or a painful one. If, I hold, it is a painful one no better sign can be had than a variation of the degree of lameness. If you have a mechanical lameness there can be very little variation in the amount of it, the horse comes out of the stable in the morning lame, he does his work lame and he gets home to the stable lame. Next morning, after a night's rest, he goes out of the stable lame, and the lameness on each occasion should be about the same if it is merely mechanical. If you have in connection with work or as the result of work, a decided alteration in the amount and degree of lameness, then that lameness must be due to some other cause than a mechanical one, and the only other cause I can suggest is pain. Percival refers to this subject, and I take Percival simply because he is about our oldest writer. He says, "It is we would repeat, truly astonishing what good effect work or forced use of the diseased joints have upon them, in proof of which we might instance the ringbones and spavined horses every day's observation brings to our notice, working in the streets of London, and it is incredible what labour such stiff-jointed, or partially stiff-jointed, horses are able to perform so long as the cavities of their joints remain uninvaded by disease." What I have said

about ringbone and spavin applies equally to diseases of other joints. You may have stiff knees, stiff fetlocks as well as stiff hocks and coronets, and if the disease cause lameness which does not vary much, then I say you have a right to conclude that it is mechanical. But if the lameness varies very much in relation to the working and resting of the horse then we can say that the disease is painful.

There is a practical importance attached to the settlement of this question. Every year veterinary surgeons are more and more employed in courts of law to give evidence, and these cases very often result in a considerable amount of conflicting testimony. I hold, in contradiction to what I often see stated, that there is no disgrace whatever to the veterinary profession because of this conflicting evidence. Every man has a perfect right to his honest opinion, and each man may differ from others as to the cause of lameness, as to the degree of lameness, and as to the amount of pain, providing there is any present. A little while ago Mr. John Roalfe Cox wrote that he believed in all cases of sprain of the sub-carpal ligament—the ligament immediately under the knee—there was always a painful condition at first in the foot; sometimes ringbones, or sometimes navicular disease developed itself very positively, and proved the correctness of the diagnosis. Now, if it be allowed that we never have a sub-carpal lameness until we have had some painful condition of the foot, then all these cases will require to be put in the category of painful lameness, but I allow no such thing. I hold that sub-carpal lesions may occur without any primary lameness in the foot or leg to cause it, they may occur simply as the result of sprain.

With regard to contracted tendons, I do not believe they even occur, except as the result of some other condition. Contracted tendons are simply passive conditions; there is no pain, but they may either accompany or be the result of a painful lameness, and the difficulty is to determine when the painful lameness has ceased, and left nothing but the mechanical. You see, therefore, although it is very easy on paper to divide lameness into two classes, painful and non-painful, when you get into practice, there is a very wide latitude, and a very great difficulty in determining exactly what the conditon is. Such difficulties I believe allow, in fact necessitate, differences of opinion by veterinary surgeons when examining the case.

Instead of believing, then, that the differences of opinion expressed by four or five veterinary surgeons on one side, and four or five on the other are disgraceful to us, I believe, on the contrary, that they are honourable to us, and that they are absolutely unavoidable. So long as a man thinks for himself, so long as a man knows what may be and what may not be, he is bound to give the best opinion he can, and in a case where it is solely a matter of opinion, and where the symptoms are very vague and do not give one a clear opportunity of distinguishing between pain and mechanical conditions, I hold it the duty of every member of the profession to give his opinion honestly and boldly, perfectly irrespective of whether he is opposed by one or twenty men. The divergence of opinion is not a question of morality, it may be one of intelligence, and it is only gross egotism which enables one man to think all his brethren must be wrong. I now leave the discussion in your hands, gentlemen, and I have no doubt you will help to elucidate the difficulties, and enable some of us, perhaps, to take a clearer view of these questions in future.

Mr. J. B. MARTIN (of Rochester): I presume this lecture is in consequence of the conflicting evidence very often given before magistrates when gentlemen of our profession are employed by the Society for the Prevention of Cruelty to Animals. I quite agree with Mr. Hunting in all he says about the honourable manner in which conscientious men give their evidence in support of their opinions; but I believe there are men in our profession, and I

say it without any fear of contradiction, who will give evidence in Courts of Law in support of cases brought by the Society for the Prevention of Cruelty to Animals, simply because they are paid to do so. They go to the courts on purpose to win the case and obtain a conviction. I have felt, on many occasions, disgusted with the Society at the vindictive manner in which they have acted. They will raise heaven and earth to gain a conviction, not with the sole object of preventing cruelty, but to get sentimental old ladies to support them. I do not believe there is a member of our profession who would knowingly support a deliberate case of cruelty. I have seen cases where horses have gone on their toes, and been worked every day, and I believe they were quite free from pain. Of course we have differences of opinion on cases, and we go conscientiously and give an honest opinion in Courts of Law; but we want more united action. I had a case with the S.P.C.A. One of their inspectors stopped a horse that walked on the toe. I knew this horse had walked on his toes for several years, I think it arose originally from disease of the bones round the pastern. The inspector brought the horse up to me, and I said, "This is not a case of cruelty in my opinion." The inspector said, "I have kept the man the whole day, and we must summon him now." I told him I could not support the summons. He got another veterinary surgeon to support it, and I appeared in opposition. The case was dismissed, but the magistrate made a remark which I think he had no grounds for making. He said, "With all due deference to Mr. Martin, I think the horse must be suffering pain." They summoned the man again, and I appeared in opposition again with two other veterinary surgeons, and the case was dismissed. I was conscientiously of opinion that that horse was not suffering pain. In cases of bent knees or any other little deformity of the legs, when all inflammation has passed away, and we get a chronic shortening of the ligaments behind the knee, a bent knee or some little faulty action in one leg only, I quite endorse Mr. Hunting's opinion that that is mechanical lameness. Mr. Hunting said he thought contracted tendons were the result of sprains, but I think in some cases, in young colts for instance before they have done much work, where you get tendons as large as your wrists, it is from some constitutional cause. I have seen colts who have done no work with these large tendons, and they go on their toes, but I do not think they suffer much pain when the inflammation has passed off. You might just as well say a man with a club foot is suffering pain. Ask any man with a club foot, whether resulting from diseased bones, contraction of the tendons, or shortening of the heel, or any other cause, and he will tell you he is not suffering pain. And if a man with a club foot in walking does not suffer pain, then a horse walking on his toes in the same manner is not suffering pain.

Mr. E. W. BAKER:—I consider this is a subject that we as veterinary surgeons ought to thoroughly thrash out. I thoroughly agree with what Mr. Hunting said, that we may have mechanical lameness without pain. A veterinary friend of mine used to make a distinction between "lameness" and "impediment." He considered where there was pain there was lameness; where there was no pain it was simply an impediment. I think we have a difficult matter to discriminate between lameness and impediment. I think where we have a difference in the action of one limb from that of the others we must have lameness. At the same time we may have lameness without the slightest amount of pain. As Mr. Hunting has stated, we may have contracted tendons in which there is not the slightest inflammatory condition, no pain on pressure, and no variation in the amount of lameness, and yet all his life the animal will be lame. We may get a similar condition in ringbone and spavin. As regards spavin, he says that should the lameness be invariably the same he would say there was no pain, while should the lameness vary it must arise from some other cause than pure impediment, and the only other

cause he could assign would be the presence of pain. I must somewhat differ from Mr. Hunting. I think we all know that in a well-formed and matured spavin we frequently have lameness of a very perceptible nature. When the animal starts out from the stable the greatest novice would detect the lameness, but after the animal has warmed to his work it passes off, and for the rest of the journey the animal will be practically without lameness. But I am afraid we cannot make that distinction. The same may occur even with contracted tendons. I think an animal with contracted tendons who is not suffering the slightest pain, may vary in the amount of lameness shown by him. We have also to take into consideration the fact that we may have lameness from the condition shown by one part, which causes interference with another, will set up a certain amount of pain; and in that case we shall have an animal working in an unfit condition. Take for instance contracted tendons, the animal will not be able to use its fetlock joint so freely as he might otherwise do. You may use the animal for quiet steady work, providing he is not put to the trot, and we may honestly say he will work without pain daily, but make that horse trot or gallop and you interfere with the action of the other parts of the limb, and cause him more or less pain. According to the work the animal does, so he may or may not be suffering pain as the result of some defects of the limbs. Mr. Martin says that he is afraid some members of our profession are only too willing for the sake of pay to go into the Courts of Law and swear anything in order to get a conviction for the R.S.P.C.A. I sincerely trust it is not for the sake of filthy lucre that they do so. I am afraid occasionally they state what is doubtful in order to gain their point, but I can hardly think it is for the sake of the money they get in these cases. Now, are we not, as a profession, taking a course which is anything but advisable in acting in opposition to a Society which is founded with the best intentions? Can we not suggest to them that the leading members of the S.P.C.A. should meet some of the leading members of our profession and discuss some suggestions that would work for the good of both? I know that at times they undertake most trivial cases, and in order to gain a conviction will move heaven and earth; but at the same time the Society is formed to prevent cruelty, and as Mr. Martin has said, there is not one M.R.C.V.S. who is less opposed to the infliction of unnecessary pain on animals than the R.S.P.C.A. I think we might suggest to the Society that prior to taking any case into court, if there is the slightest shadow of doubt they should call professional opinion as to it. Would not that avoid the conflicting evidence that we get day after day in the courts? Recently Mr. Blake of Bournemouth was charged with perjury, and I should like the members of this Association to record their sympathy with him on account of the action that has been taken by the R.S.C.P.A. Mr. Blake was called in to give evidence in a case in which a man was prosecuted for working a horse in an unfit condition. The horse was stopped, I believe, on account of the condition shown by its off hind leg, which was permanently enlarged from attacks of lymphangitis. In examining the horse Mr. Blake casually observed that there was an abrasion on one of the forelegs. When the case came on before the magistrate Mr. Blake attended and stated that the animal had this enlarged condition of the hind leg, and that the work would benefit it. He also stated that there was no wound on the knees, and he stated the abrasion, which he had casually noticed when examining the horse, was on the near when it was on the off leg. On the strength of his evidence the magistrate dismissed the case. Two of the magistrates afterwards went and saw the horse and found a wound at the extreme upper part of the off fore knee, not on the near as stated by Mr. Blake. This occurred in March. Nothing more was done until August when he inspector and one of the staff of the S.P.C.A. called upon Mr. Goodall and myself and told us that they intended prosecuting Mr. Blake for perjury.

This they did in September, and the case was heard at Poole, when the two magistrates who had seen the horse gave evidence. The Clerk of the Court, the superintendent of the police, and other witnesses stated that they believed Mr. Blake to be a man of irreproachable character, but in the face of the evidence given by the magistrates, the Bench could not but send the case for trial. Last week the case was heard at the Assizes. The Judge, however, dismissed the case, making strong comments as to the manner in which the prosecution had been conducted by the S.P.C.A. which, in his experience, he said was wholly unprecedented.

Mr. W. H. FLOOK: This is a subject which has a great deal to do with the dealings of the R.S.P.C.A., with our profession, and with the public. I think a great mistake made by the Society is their keeping an inspector so long in one place, where he gets to know the people he may safely go against and those he had better leave alone. With respect to the question of definition of lameness, Percival says that in order to show the lameness the animal must be moved, but Prof. Williams considers that lameness may be shown in the stable. I do not consider an animal is lame until he is moved. One of the best definitions I have heard of lameness is that of Prof. Penberthy. He says "lameness is an abnormality in gait manifesting pain or defect." I think that is very neat and very short. I have given that definition when giving evidence for the Society, although it might be said in some cases, as at present, we discuss the point more against them than for them.

With respect to contracted tendons, I think that often in cases of contracted tendons you get a jar of the foot and consequently the tendons would not show heat and tenderness. They make a great point in the Police Court about heat and tenderness. I should like to ask you, Mr. President, whether we can always find heat and tenderness when there is pain. Unless we can say heat and tenderness should be present in all cases of lameness there is no doubt there must be differences of opinion, especially if it be, as Mr. Hunting says, that the lameness should be invariable. It would take up too much of our time to watch an animal from the time it leaves the stable until it returns in order that we might swear that the lameness was invariable in cases of stiff joints, and so on. In hock lameness, too, I imagine we always get a certain amount of variation. An animal never comes in as badly as it went out. As the animal warms to the work some of the lameness wears off. A stiff knee seems to be a splendid example of mechanical lameness, that is, lameness due to defect and not to pain. The only other question which occurs to my mind is—in cases of doubt should the man who is working the animal or the animal get the benefit of the doubt?

Mr. F. W. WRAGG: I think there is no doubt that there are cases of defective action or lameness in animals where it is not cruelty to work them. Something has been said about the R.S.P.C.A., and I think perhaps some of the remarks have been a little severe, especially as applied to our professional brethren. Mr. Hunting made a remark, which I think was very apt, to the effect that veterinary surgeons, like all other professional men, are found to give evidence on each side of the case, and he had no doubt that veterinary surgeons gave their opinions in a thoroughly conscientious manner. That is my opinion. I care not whether a man gives his evidence for or against the Society. I give every man credit for giving his opinion in a perfectly conscientious manner, without fear or favour, and I do not think that because he happens to be employed by the Society, and is paid by that Society, that he is inclined to give an opinion other than conscientiously. There is one thing we should bear in mind when we are criticising the Society, and that is that the officers of the Society do not look at the cases with the professional eyes that we do. Perhaps they get their cases up with a little more zeal than we think necessary. They seem, from our point of view, to be too zealous in

trying to get a conviction in cases which they should not, perhaps, press quite so much.

Mr. MARTIN: They have to get the sanction of Mr. Colam before prosecuting.

Mr. WRAGG: I believe every case is placed before the Secretary, but then you must bear in mind that the action of the Secretary depends upon the manner in which the officer lays the case before him. If that officer, in excess of zeal calls a case a case of cruelty, which we as veterinary surgeons should not call a case of cruelty, I do not think you must blame either the officer or Mr. Colam. I think they should be guided entirely by their professional advisers. There is no doubt that this Society does do a very great deal of good.

The PRESIDENT: I should not like this discussion to close without offering a few remarks. I know this question of mechanical lameness is one upon which veterinary surgeons differ very much. In the majority of prosecutions, veterinary surgeons are called for the defence, and in three cases out of four it is argued that the lameness is due to mechanical causes. Mr. Hunting has quoted some words used by the late Montagu Williams to the effect that the fact of a horse being lame was proof of pain. I am bound to say that to a very great extent I agree with that. I do not for a moment suggest that there are no cases of pure mechanical lameness when there is no pain whatever, but I say such cases are very rare indeed. Mr. Baker has referred to mechanical defect in the knee joint. I can call to mind the case of a horse that I hunted myself that had undoubted anchylosis of several joints of the knee. There was no lameness whatever, and, therefore no pain; the animal could fence splendidly. That is an instance of purely mechanical defective action. Some of the speakers said that lameness does not occur when there are contracted tendons. I quite agree with all that has been said. Contracted tendons in themselves do not cause painful lameness, but the lameness is due to the animal resting the tendon in order to give relief to some other part of the foot. Reference has been made to Mr. Cox's opinion that sprain of the sub-carpal ligament is almost invariably the result of foot mischief; I must say that I cannot agree with that. When you consider the animal that is generally the subject of sprain of the sub-carpal ligament, viz., the cart horse, you will find that that class of horse very seldom suffers from internal foot mischief. Of course the cart horse has sidebones more often than any other class of horse, but the absence of internal foot mischief in the cart horse is evidence that the sub-carpal sprain is not due to that. It is unfortunate that we cannot as it were schedule cases of painful lameness which are fit cases for prosecutions. It would be impossible to do that, and even if it were not, there would still remain differences of opinion between veterinary surgeons as to whether these diseases really existed at all. I think that it must be left at all times to the judgment and fairness of the professional witness who is called in. I have said that I do not think there are very many cases of purely mechanical defective action. If you take the case of ringbone you will find that there are very few ringbones that do not cause some pain. There are, of course, exceptions, but when you come to consider the enormous amount of bony deposit that you find round the pasterns at times, whether that joint is ankylosed or not you have an upward pressure on the tendon which passes down the front of the pastern, and that in my opinion very frequently causes excruciating pain. I quite agree with Mr. Hunting that the variation in lameness should help us in forming an opinion as to whether the animal is suffering pain or not. To my mind it is certain that if an animal is mechanically lame the lameness will remain the same from Monday morning until Saturday night. Heat and tenderness are the main tests relied upon by those who take up these prosecutions, but it is difficult when the outside skin covers the seat of the disease to test it with the thermometer; it is only by delicate feeling

with the hand that one can be guided as to the existence or not of heat in the part. I quite agree with what has been written that a man frequently imagines there is heat when there is not, because the temperature of the hand is not always the same. I think you will agree that an animal that is mechanically lame ought not to be called upon to do the same amount of work as a horse that is sound. Mr. Martin has spoken about the case of a man with a club foot. Well, I venture to say that a man with a club foot is not able to perform the same amount of work with that limb as a man with a perfectly sound limb. I think all cases of spavin, sidebone, or ringbone, that occasion any amount of defective action are painful. I believe there is a certain amount of inflammation between the bones which causes lameness, although it may not be readily detected on the surface. Mr. Hunting quoted from Percival to the effect that in cases of dislocation of the patella there was no pain. Well, there may not be any serious amount of pain attendant upon such an accident, but I should be very sorry to have my knee cap put out, and I know I should experience not only difficulty in using the limb, but very great pain. With regard to the conflicting evidence given sometimes by veterinary surgeons, that does exist and always must exist. There are certainly cases where there are justifiable differences of opinion, but I have seen cases where the difference of opinion is altogether unjustifiable. I do not think it is due to deliberate perjury, but a veterinary surgeon may have formed an opinion to the best of his ability, and, although as the case proceeds he sees his error, having once given his opinion he will stick to it. That is where I think judges are sometimes justified in making the remarks they do upon the manner in which veterinary evidence is given. I like to think as well as possible of my brother practitioners, but when I see circulars issued in which a man says: "Cruelty cases defended," I cannot help thinking that that man is like a lawyer who means to do the best he can for his client and say anything to get him off. I think you will agree with me, therefore, that there are cases where the evidence of veterinary surgeons, whether for or against the case, must be looked upon with a certain amount of suspicion. I think we ought to be exceedingly thankful to Mr. Hunting for his kindness in coming here to-day, and I shall presently propose formally that the very best thanks of the members be tendered to him.

Mr. HUNTING, in reply, said: In introducing this subject I endeavoured to treat it rather more from the surgical than the forensic point of view, but it has been widened out very considerably by all the speakers. In fact, you have applied practically to cases of prosecution for cruelty to animals all that I have said. Mr. Martin refers to an instance—and we all meet them frequently—of horses who suffer from some lameness "working sound." They are very common, and it is very puzzling. In a charge of cruelty, a man has to decide not merely the nature of the lameness, but the justifiability of it as well. Supposing you have a horse that suffers from navicular disease or from spavin, and it goes lame for five or ten minutes every day at starting, and at the end of that ten minutes does its work as well as any other horse, what are you to do—poleaxe it, or continue to work it? He cannot work it without inflicting a distinct amount of pain every day, but having afflicted that amount of pain, the horse does its work as well as any other horse. You cannot bring into this question, as you can in the case of man, the animal being allowed to live simply for its life's sake. It is a matter of £ s. d., and a matter of humanity. I hold that in a case like that, where a horse maintains its condition, and shows no constitutional disturbance, you have a perfect right to work that horse; and I hold entirely with Mr. Flook, who said that in many cases it becomes a question whether the doubt should be given in favour of the horse or its owner, and that in such a case the doubt should be given in favour of the owner. There are a large number of men who have

to work who are not free from some defect which causes them pain, and if that is so, why should the sentimental notion of a horse suffering five minutes pain in twenty-four hours be sufficient to have a man punished or a horse killed? I hold that humanity and common sense suggest that there are scores of horses for which men are fined or punished by being sent to prison, which are quite fit to work. You have to consider the degree of pain, as well as the existence of pain, and it seems to me that the R.S.C.P.A. have adopted the principle that if a horse is in any pain it must not work. The degree is never gone into, and they have educated the stipendiary magistrates of London until no man cares to go into a case now. When you go before the magistrate you meet with a prejudice dead against you. You are looked upon as coming there to support inhumanity, and you are occasionally insulted. Hardly any evidence is required. The magistrate takes it that the very fact of the society prosecuting establishes the case, and unless you can show an extremely strong case, you are bound to lose. To show a strong case means expending £4 or £5 on a solicitor and veterinary surgeon, and if there are three or four veterinary surgeons against you, you will have to expend £10. Now, you have your choice; defend and expend £10 and you will probably win, or plead guilty, and put your oldest suit of clothes on and you are fined 20/- and costs. You will find that if the society win the costs are allowed, from 12/6 to 3 guineas, and sometimes 5 guineas; but if the owner of the horse wins, his costs are never allowed, upon what principles I really cannot say.

To go back to our subject. We have to consider not only whether it is mechanical lameness or whether there is pain, but also, I hold, what degree of pain there is. In some cases you have absolute good derived from working a horse, and absolute harm from allowing him to rest. You can easily imagine a man being prosecuted for exercising a horse suffering from acute lymphangitis, but I am prepared to hold in any Court of Law, and before any meeting of veterinary surgeons that the best thing you can do is to exercise that horse. (Hear, hear.) I said that variation of lameness showed pain. Mr. Flook pointed out that he did not quite agree with me, and said you often find variations of lameness without pain or without any evidence of pain. I think I am quoting him rightly; at any rate he said that variation of lameness could not be accepted as always showing whether the lameness was painful or not. Now take a case of cracked heel with a swollen leg, one of the most painful diseases I know of. I have no hesitation in saying that it is cruelty to animals to keep that horse in the stall, and that the very best thing you can do for your horse is to exercise him, and after he has gone 100 yards he will put his leg down the same as any other horse. In a case like that you have some mechanical lameness from the swelling but still more from pain. If you exercise your horse you have a very considerable variation in the lameness, a variation due not merely to the cessation of the pain, but also to the clearing up of the soft exudation, and, therefore, where you have lameness due to soft exudation the proper thing is to exercise it. The effect of the quality of work on some lamenesses has also been referred to. There are many cases where a horse is quite able to walk all day and pull a load, and yet not be fit to trot, and especially is that the case in some mechanical lameness. If a horse has a very bad shot fetlock for instance, he will walk with no pain, but if you were to trot that horse on a hard road for any length of time, the effect of the irregular position of the bones at each step when the weight came upon that leg might cause some amount of pain. Therefore it was evident that horses with lameness may suffer great pain or very little according to the work they are doing, walking or trotting, on level or rough ground. It is very amusing to hear some of the remarks of the Bench of London on this question. You get a case where the horse is lame, and they at once say, "Ah! this horse would be better down the country, on the soft ground!" Probably the case

has nothing at all to do with the foot!" Soft ground generally means irregular ground, and I hold if there is any deviation from the proper angle of the bones—say contracted tendons, or shot fetlocks, or stiff knees—that the very place you ought not to send a horse to is an uneven country road or a ploughed field. You had better keep it on the level streets of London. Concerning the question of veterinary evidence, undoubtedly we all make mistakes, and there is a tendency in man to strengthen his case and do his best for his client. You get a prejudice, or what Herbert Spencer calls an "unconscious bias," either in favour of or against a thing. I am inclined to think that if you want the nearest approach to abstract justice the proper thing would be to do as they do in Prussia, let the Court call the expert witnesses; and I believe if the Court called one veterinary surgeon you would get better justice than you would get from two called on opposite sides. Not that I object to a large number of witnesses giving their evidence on opposite sides at all, because if you have five men on one side and five on the other, each of them trying to prove their point, and you have a judge with common sense and a knowledge of the world, the very fact that each of the ten slightly stretching their evidence or suppressing little bits here and there will just about bring it out level in the end. The whole question of the morality of advocacy has been discussed over and over again, and the question of expert witnesses acting as advocates has also been discussed over and over again. It is not a weakness found only in our profession, it is found in every profession. There are medical men, engineers and architects, who are looked upon as being invaluable in a Court of Law because they can clearly state their case and not state too much. Perhaps, however, some of the differences may be accounted for by the fact that some men take a little time to think the matter out before going into the witness-box, while again others do not. There are many cases of differences of opinion without dishonesty. Perhaps a point is suppressed, and the witness naturally lays the blame on the solicitor for the other side not drawing it out—"if he had asked me," he says, "I would have told him."

With regard to heat and tenderness, while there are cases in which it is an indication of pain, you may have conditions of the skin which will cause heat and tenderness, and these may have no relation whatever to the lameness. In the navicular disease we know there is no heat or tenderness, and we know also that where ulceration of the bone is going on there is a great deal of pain, so that it cannot be looked upon as a very diagnostic symytom. If you are appearing for the prosecution you can stick to heat and tenderness—the magistrate appreciates that. To-day we have no wish to help a client or "lick" the other fellow, we have been discussing the matter in cold blood and yet we have had many differences of opinion. There are many difficulties which present themselves in dealing with this question; first we differ as to what is mechanical lameness and what is painful lameness, then as to the degree of pain, and lastly, what degree of pain constitutes cruelty. All these are very difficult matters to decide, they crop up in nearly every prosecution and they afford a very wide field for differences of opinion.

The PRESIDENT: I will now formally put the proposition:—"That a hearty vote of thanks be accorded to Mr. Hunting for his kindness in coming here and interesting us to-day.

Mr. MARTIN: We have had a most practical and interesting lecture to-day, and I have no doubt it will be the means of setting people thinking about this subject of "mechanical lameness," and it may lead to some united action being taken, as suggested by Mr. Baker, to approach the R.S.P.C.A. as to whether independent veterinary surgeons should not be consulted before the prosecutions are instituted. I have much pleasure in seconding a hearty vote of thanks to Mr. Hunting.

The vote was carried by acclamation.

Mr. MARTIN: After hearing the statement by Mr. Baker as to the action taken by the R.S.P.C.A. against Mr. Blake, I think it only right that we should tender him our sympathy. I think it devolves upon every member of the profession to help the Society when they have deserving cases, but when they resort to such tactics as in this case, their action cannot be too strongly condemned. They have behaved in a most disgraceful and vindictive manner towards Mr. Blake, and I propose that we express our sincere sympathy with him at the trouble and expense he has been put to.

Mr. BAKER: I have much pleasure in seconding this motion. The motion was carried unanimously.

Mr. HUNTING then briefly returned thanks for the vote that was accorded him.

On the motion of Mr. MARTIN, seconded by Mr. WRAGG, it was agreed that the meeting in March be held in London.

A vote of thanks to the President for his conduct in the chair concluded the meeting.

THE SCOTTISH METROPOLITAN VETERINARY MEDICAL SOCIETY.

A MEETING of the above Society was held in the London Hotel, Edinburgh, on 28th November. The President, Professor W. O. Williams, in the chair. There were present Principal W. Williams, Richard Rutherford, F.R.C.V.S., Professor De Jong, Professor Bradley, Dr. Longden, Messrs. Cameron, Berwick-on-Tweed; Connochie, junr., Bannatyne; Carruthers, W. S. Maloney, J. W. Martin, M. F. Lynch, J. Nuttall, P. J. Cronin, H. B. Allan and the Secretary.

Mr. W. Carruthers, Perth, was elected a member of the Society, and Vet.-Capt. Moore, 12th Lancers, was also elected an honorary member.

The annual nomination of the president, vice-presidents, and honorary secretary and treasurer, was next proceeded with, no change for the ensuing year in any of the offices being made.

The PRESIDENT stated that he thought the meeting afforded him an excellent opportunity of drawing the attention of the members to a phase of veterinary practice that he would relate, and which was of great public importance. Very recently a case of scarlet fever occurred in a horse in a certain district in Edinburgh, where scarlet fever was prevalent among the human population, with the extraordinary result that the spread of the disease has been attributed to its existence in the horse. As many present were aware, a dread has lately arisen that there is great danger of contracting infectious diseases, such as mange and strangles from the lower animals. It is well in the circumstances for the public to know that scarlet fever in the horse is a non-contagious disease, as may also be said of the diseases strangles and mange as regards their communication to man.

Mr. R. RUTHERFORD said as an offset to the case mentioned by the chairman, he would mention a case which came to his knowledge some time ago in the city, which had marked symptoms of scarlatina or purpura. He said to the coachman he thought the trouble was much like scarlet fever, and the man then stated that some children living above the stable were down with that disease, and that two of them had been removed to the hospital. He discovered that the drains of the place required overhauling, and they passed through the stable above which the children were lying, which went to prove to some extent the same cause which produced it in the children, also produced it in the horse. At the same time he did not think scarlet fever was transmissible from the horse to man.

Principal WILLIAMS said this case of scarlet fever was a little different from purpura. This horse spoken of by Mr. Rutherford was placed in very unsanitary conditions—if they looked upon scarlet fever of the human being as a contagion and infection so subtle that even months after a person had recovered from it the infection could be caught by others. A case illustrative of this took place in Melbourne, where a lad who had been ill with scarlet fever three months before was taken aboard a ship after all necessary precautions, and within a short time scarlet fever broke out upon the ship. He considered the infection to have been carried by this lad. They could not say that the horse carried the infection so long, and could not associate the specific form of scarlet fever in the horse with that of the specific generic and very infectious germs of scarlet fever in mankind. He remembered a very marked case where two cats contracted scarlet fever from some children, and from which one of the cats died. He had made a *post-mortem* upon the cat, and it undoubtedly presented the symptoms of scarlet fever. He could not associate in his experience any infections found in man with the horse. With regard to the transmission of mange, it was a great pity that at public lectures the whole report had not been given. He had people coming to his place under the impression that they had got the mange from their dogs. The actual fact was that the mange of the horse and dog lived for a very short time in the human being. They did not breed upon the skin of the human being, and he thought so far as that was concerned it was perfectly safe even to associate with dogs or horses. He thought the misleading statements should not have been put forward, because they frightened the public. There was no danger, and that had been proved by practical experiment and not by assertion.

Mr. CAMERON, Berwick-on-Tweed, said he had once seen a case resembling scarlatina, due to defective drainage and ventilation in the stable. It happened during stormy wintry weather.

Professor BRADLEY then read the following paper on

"FLATULENT COLIC."

Mr. President and Gentlemen,—I had intended to restrict myself to the bare description of an uncommon and somewhat new method of employing drugs in the treatment of flatulent colic, but at the request of the secretary I consented to extend my remarks to a brief description of the disease itself. I regret very much that want of time has prevented me writing as full a paper as one could wish, but trust that the discussion to follow will to some extent counterbalance this deficiency.

The term colic in its most extended sense simply indicates symptoms of pain produced by a variety of causes; for instance, we have renal and hepatic colic due to calculi, etc., a colic or at least colicky symptoms in some cases of pleurisy, but the unsatisfactory term colic has by common acceptance been more particularly reserved in veterinary nomenclature to express symptoms indicating pain arising from abnormal conditions of the intestines and stomach, more especially the former. I stigmatise the term colic as unsatisfactory, and for this reason, it does not give any inkling into the particular abnormal condition or the cause of such condition.

Intestinal colic is usually divided into two varieties; spasmodic and flatulent. The former being produced by volvulus, calculi, intussusception, etc., the latter by impaired digestion, some particular kinds of food which have a tendency to produce gases in large amount during the process of indigestion, or some obstruction, such as calculi, and is also said to appear in some cases of exhausting diseases, when it indicates approaching dissolution.

Flatulent colic is that condition produced by the evolution of gases in large

amount in some part of the alimentary canal and the consequent distension of that portion in which this occurs, excessive and continuous pain resulting. The two common seats are the stomach and large colon, and it is particularly to flatulence or tympany of the latter that I wish to draw your attention.

The symptoms of flatulent colic are too well known to require a detailed description; tympany of greater or lesser extent is the chief symptom, the distension usually being most manifest in the right flank, owing to the large colon being situated chiefly in that region.

The treatment depends upon three principles: First, the removal of the cause; second, the removal of the accumulated gases, and third, the prevention of further evolution of gases, always, of course, at the same time endeavouring to alleviate the pain by anodynes and antispasmodics.

The first end may be obtained by giving a cathartic. The second by administering some drug which will combine with, or in some other way remove the gases; but this is at the best a slow process, on account of the agent if administered by the mouth having to travel through the stomach and the whole length of the small intestines before it can assert its influence; the objection does not obtain in tympany of the stomach. Another, and the best way of removing the gases, is by puncturing the colon with trocar and cannula. Principal Williams in his "Principles and practice of Veterinary Medicine," points out the necessity of this being done in the early stages, before the animal becomes exhausted; no great amount of skill is necessary to perform this operation, the ends of the transverse processes of the lumbar vertebræ, the last rib, and the anterior iliac spine on the right side being taken as landmarks, the point usually chosen being about equidistant from these three objects; though when there is considerable distension they are obscured, and the practitioner has to depend in a great measure upon his own judgment. The third result, *i.e.*, the prevention of the further formation of gases, is commonly sought to be effected by the administration of antiseptics, or perhaps it would be more correct to say antizymotics—by the mouth. Carbolic acid, turpentine, hyposulphite of soda, etc., are examples of the drugs employed.

But there is the same objection to this method that there is to the similar means of dissipating the gases, viz., that the drugs are a long time in acting, and if there is much food in the stomach and intestines the time is of course proportionately increased. A much more effective method of employing drugs for this purpose would be the immediate injection of the antizymotic into the bowel itself. We have tried this with marked success in the New Veterinary College Infirmary during the past year, and opportunities of testing its efficacy have not been wanting, for during the past summer and autumn colic, and particularly the flatulent form, has occurred as something very like an epizootic, for this is the only way of expressing its extreme prevalence.

I will now describe the *modus operandi*. The instruments required are an ordinary trocar and cannula and a Toope's cannula. The bowel is punctured in the usual way and when the gases have escaped a solution of from drm. ij. to drm. vi. of pure carbolic acid dissolved in at least Oj. of water is injected through the ordinary cannula by means of Toope's injection cannula. This is all that is necessary, and rarely have we found the gases reaccumulate unless some serious abnormality or obstruction has been present. There is one precaution to be observed, and that is that the cannula is still in the bowel when the solution is injected; this is shown by a small amount of gas being expelled with each respiratory movement. I would suggest that the solution be used warm, for otherwise it is liable to cause shivering, which however, only appears to be a temporary inconvenience, no serious after-effects being produced. The action of the carbolic acid is in all probability two-fold. First, it exerts its antizymotic powers, and secondly, it may act to some extent as a local anæsthetic.

I will now quote brief notes of cases in which this treatment has been tried.

Case I.—Brown van gelding, admitted at 11 a.m., colicky pains; slight tympany. An ordinary colic draught administered. Morphine injected hypodermically.

12 noon. No better; continually walking round box, oz. ij. sodium hyposulphite given.

9 p.m. Pulse 80 and getting weaker: very tympanitic. Punctured and injected drm. iv. carbolic acid in Oj. of water.

9.30 p.m. Much better; pulse 60 and stronger; breathing quieter, does not walk round box but stands quiet.

10 p.m. Still improving, pulse almost normal. Next day, well.

Case II.—Bay cart gelding, admitted 2.30 p.m., colicky symptoms, much tympany. Punctured and injected drm. iv. carbolic acid in Oj. of water.

3 p.m. Much better. No recurrence of tympany, pulse 65.

4 p.m. Still improving, colicky symptoms have disappeared, pulse and respiration normal, continued improving.

Case III.—Brown harness gelding, admitted 7 p.m., restless, pawing and walking round box and rolling. Pulse and respiration accelerated. Oil, opium, and turpentine given.

7.30 p.m. Quieter.

8 p.m. Again restless, tympanitic. Punctured and injected drm. v. carbolic acid in Oj. ss. of water.

8.30. Much easier, pulse and respiration slower.

9.30. Still improving.

Case IV.—Black cart mare, admitted 6 a.m. Great pain, very tympanitic; pulse weak, respiration much accelerated. Punctured and injected drm. ij. carbolic acid in solution. Morphine hypodermically.

6.30 a.m. Easier, pulse 70.

8 a.m. Again tympanitic and very restless. Punctured again and injected drm. iij. carbolic acid in Oj. of water.

9 a.m. Better. Pulse 60, and stronger; respiration slower. Has stopped walking about.

10 a.m. Pulse and respiration nearly normal. No pain evinced.

I think the above notes, though very incomplete, are sufficient to illustrate the beneficial results produced by this line of treatment, and to show that at east *it* is worthy of trial.

Discussion.

In the discussion which followed, Mr. Rutherford regretted that there was not a larger meeting of their elder members of the Society to listen to the contribution by Professor Bradley of the clinical method of dealing with what had hitherto been a troublesome disease, and he had a large opportunity of studying those cases. Indeed, in some stables it had raged like an epizootic. He thought that might be explained by the large amount of foreign fodder which found its way into the market. Some of the fodder was not fit for bedding pigs, far less for feeding horses, and caused colic in the stomach and bowels. For this he had adopted the puncturing the bowel ever since that method was brought in by an American gentleman some time ago, but he thought the method put forward by Professor Bradley was a distinct advance over that method, and it would not be long until he adopted it. In cases of ordinary colic—he did not allude to twists and ruptures which might occur at any time during the horse's struggles—they had to consider what would afford the animal relief. He had used carbolic oil and glycerine for a long time, and had also occasionally used spirits of ammonia, which proved very efficient. The method put forward by Professor Bradley seemed to Mr. Rutherford to be a remedy for what was a common accident—no matter what

precautions were taken—namely the formation of an abscess on the right flank. He did not know why those abscesses occurred, and several gentlemen to whom he has spoken on the subject said they had the same experience frequently. He had spoken to a gentleman in Newcastle, and his experience was something of the same. He thought it strange that those experiences did not find their way into print. In some of the horses, the instrument passed through a very great depth of substance—muscles and tissues—and if that horse was put to work immediately after it recovered, he thought the abscess might occur from the movement of those muscles. In his hands, despite all precautions he had taken, those abscesses occurred on the flank upon puncturing the bowels frequently, although it was not a dangerous accident. In conclusion, he hoped that the Professor's paper would lead to ways and means whereby this disease, which had been too long neglected, and which carries off more than three-fourths of all the horses which die, might be removed. It had been too long neglected, and while they spent years enquiring into different diseases, they had neglected those diseases which most demanded their attention.

Professor WILLIAMS said he thought that the treatment of the puncturing might have something to do with the formation of abscesses. When he punctured he sloped the trocar slightly upwards. In only one horse did that treatment prove fatal, and that horse had been punctured thirteen times before it died. On examining the bowels after death, with the exception of three or four little spots about the size of flea bites, marking where the latest punctures had been made, and the slightest abscess, there was nothing else. He never knew of bad results from puncturing that was performed early enough. Some of the English practitioners punctured through the bowel, but he had not experience of that method, and he did not think the operation was so successful as the method adopted here.

Professor DE JONG said he had seen only one case of abscess in the flank as a result of puncturing.

At the conclusion of the discussion Professor Bradley was unanimously thanked for his valuable paper.

Mr. RUTHERFORD next gave a notice of motion that at the next meeting he would bring forward some suggestions in reference to public horse-ambulances, so frequently required in large cities.

Professor W. O. WILLIAMS also announced that he would make some remarks in connection with the Society for the Prevention of Cruelty to Animals.

The business of the meeting then terminated with a vote of thanks to the President.

PETER MOIR, Hon. Sec.

GLASGOW VETERINARY COLLEGE.

THE Christmas examinations of the Royal College of Veterinary Surgeons were conducted within this institution on the 15th December. The Board of Examiners included Dr. George Fleming, C.B., &c., London; J. Roalfe Cox, F.R.C.V.S., London; Duguid, F.R.C.V.S., London; J. Freeman, F.R.C.V.S., Dublin; Professor Hamilton, M.D., F.R.C.S.E., Aberdeen; Professor McKendrick, LL.D., Glasgow; Veterinary-Lieut.-Colonel Walters, F.R.C.V.S., Woolwich; T. H. Simcocks, F.R.C.V.S., Drogheda: Finlay Dun, F.R.C.V.S., Edinburgh; H. Olver, F.R.C.V.S., Tamworth; W. Woods, F.R.C.V.S., Wigan: Veterinary-Lieut.-Colonel Duck, F.R.C.V.S., Aldershot; J. Clark, F.R.C.V.S., Coupar-Angus; Dr. Sims Woodhead, London; Veterinary-Capt. Smith, F.R.C.V.S., Aldershot; J. Malcolm, F.R.C.V.S., Birmingham; Professor J. R. Green, M.A., B.Sc., London; W. A. Taylor, F.R.C.V.S., Manchester

Dr. Peacock, F.R.C.V.S., Hyde Park; H. Sommerville, B.Sc., London; and R. Rutherford, F.R.C.V.S., Edinburgh. There were also present as *ex-officio* members, Principal McCall, M.R.C.V.S.; Professors Limont, M.A., M.B.; Thomas King, J. McIntosh McCall M.B., C.M., M.R.C.V.S.; C. M. Aikman, M.A., B.Sc., &c.; J. Murphy and T. A. Trotter, M.R.C.V.S.; and W. S. Johnson, Secretary.

The following gentlemen passed the first (or theoretical) part of the final examination:—Messrs. P. J. Welch, Saffron Walden, Essex; S. B. Clode, Cardiff, Glamorganshire; Joseph Magee, Tullintrain, Londonderry; John Kerrigan, Clydebank, Dumbartonshire; Henry O'Boyle, Randalstown, Co. Antrim; D. S. Houston, Port Glasgow, Renfrewshire; Hugh McCartney, Neilston, Renfrewshire; and James Steel, Dalry, Ayrshire.

The following gentlemen passed the "B" or second professional examination:—Messrs. L. H. MacQueen, Cardonald, Renfrewshire; David Wyllie, Stewarton, Ayrshire; M. T. Giblin, Glasgow (great credit); Robert Griffin, Skerries, Co. Dublin; and Andrew Spruell, Paisley, Renfrewshire.

The following students passed the "A" or first professional examination:—Messrs. James G. Reynard, Kirkintilloch, Dumbartonshire; John Brown, Airdrie, Lanarkshire (great credit); Francis Russell, Ballynahinch, Co. Down; Randal McDonnell, Ballycastle, Co. Antrim; W. A. Campbell, Girvan, Ayrshire; George Thompson, Rushbyford, Durham; James McIntyre, Port Glasgow, Renfrewshire. John McLean, Largs, Ayrshire; A. B. Sullivan, Govan, Lanarkshire; Hugh McVean, Duntocher, Dumbartonshire; W. Neilson, Helensburgh, Dumbartonshire: and George Broom, Glasgow.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

At the monthly meeting of Council held on December 6th, Mr. Ashworth reported that a letter had been received from the Farriers' Company consenting to confer the Freedom of their Guild and to provide the first prizes in each of the two classes of the Horse-shoeing Competition as before. A letter had been read from Mr. R. S. Reynolds, M.R.C.V.S., of Liverpool, accepting the terms of his appointment as the Society's Provincial Veterinary Surgeon for South-Western Lancashire. Of the £600 granted to the Committee for the year 1893, the sum of £502 14s. had been expended, viz., £500 to the Royal Veterinary College, and £2 14s. for medals to proficients in cattle pathology. The Committee moved for the renewal of their grant of £600 for the year 1894, and that of this sum £500 be allocated to the Royal Veterinary College in aid of the further development of comparative pathology and bacteriology. The Committee had met eight times and made eight reports. Professor Brown had presented to the Committee the following report:—

Pleuro-pneumonia.—Since the last meeting of the Veterinary Committee, another outbreak of this disease was discovered in a London cowshed. On November 6th a cow from this cowshed was sent to the Metropolitan Market, and when slaughtered the same day, in one of the adjacent slaughter-houses, was found affected with pleuro-pneumonia. The whole of the cattle on the premises from which she was sent were slaughtered by order of the Board of Agriculture, and three more were found affected with the disease. An order has been passed by the Board of Agriculture dealing with the movement of cattle out of the London cowsheds, and another dealing with the movement of cattle out of certain parishes in the County of Middlesex.

Swine Fever.—Since the 1st of last month the Board of Agriculture, under the Swine Fever Act, has been dealing with this disease instead of the local authorities, so far as slaughter and compensation are concerned. It is too early to form any estimate of the progress being made towards eradicating the

disease, but judging from the returns published in the *London Gazette* the Board is carrying out the slaughter of diseased and in-contact pigs in a very energetic manner. The total number slaughtered in the three weeks ended November 25th was 2,093, of which 2,070 were diseased or in contact, and twenty-three were slaughtered as suspected, but on *post-mortem* were found free from the disease.

Anthrax.—The returns of this disease still continue abnormally high. In the week ended November 25th there were eighteen fresh outbreaks reported and thirty-one animals attacked. The average for the forty-seven weeks of the present year has been about ten outbreaks and twenty-four animals attacked. This year there have been 499 outbreaks and 1,162 animals attacked, as compared with 249 outbreaks and 550 animals attacked in the corresponding period of last year.

Rabies.—This disease has recently been more prevalent than usual. In the four weeks ended November 25th there were fourteen cases reported. In the corresponding period of last year there were only eight reported.

Notes and News.

Civic Office.—We have pleasure in announcing that Mr. T. M. Inglis has been elected a Member of Council for the Royal Burgh of Forfar, N.B.

Hydrophobia in Russia.—During the past year 1,652 persons bitten by rabid animals have been under treatment in the seven Pasteur stations existing in Russia. Of these 42 have died of hydrophobia.

Horses in Germany.—In 1892 there were 2,647,388 horses in the whole of Germany. In 1891 there were imported from abroad 90,129 horses, valued at about three-and-a-half millions of pounds, while the exports were 8,869, valued at about half a million of pounds.

Veterinary Surgeons in the German Army.—The number of veterinary surgeons in the Prussian Army—the Guards, first to eleventh, and fourteenth to seventeenth Army Corps—is 430. These are allotted as follows:—16 *Corps d'Armée* veterinary surgeons, 115 regimental veterinary surgeons, and 193 veterinary and 106 assistant veterinary surgeons. The Bavarian, Saxon, and Wurtemburg armies have their special *cadres*, but those of Saxon and Wurtemburg are in conformity with the Prussian *cadres*. Since April, 1890, all the veterinary surgeons, with the exception of the assistants, have the rank of superior executive officers of the Army, and in this way they are assimilated with these officers, but have no definite rank. The assistant veterinary surgeons remain as non-commissioned officers, and grade with quarter-master-sergeants.

Employment of Camels in Russia.—For some years, says the *Journal d'Agriculture Pratique*, there has been witnessed the very curious phenomenon of the camel being substituted for the horse and ox as a draught animal in certain parts of the empire where previously it had only been seen in menageries: now it is employed by hundreds, and on large properties as well as by the peasantry. The camel does all kinds of farm work—draws the plough and the wagon. The general use of the animal commenced in the provinces adjoining the Caspian Sea and the Sea of Azof, and its diffusion has been more particularly accelerated since an improvement in harnessing it was introduced. This consisted in the adoption of a flexible collar and traces instead of the yoke, which had hitherto been exclusively in use. Camels are now doing agricultural work in the governments of Kief, Poltava, Pensa, etc. The great market for them is at Orenburg. A camel is worth sixty to seventy roubles delivered at Kief.

Return of Domesticated Animals to a Wild State.—Commenting upon some remarks which appeared under this heading as to the alleged ten-

dency of Devon cattle, when turned out in Queensland, to go wild, "Bruni," in the *Australasian*, remarks:—"All our domestic cattle exhibit a tendency to become feral when the conditions of life are favourable. In our climate cattle do not rely upon the assistance of man for their support, and when his discipline is relaxed for any length of time they quickly become wild. The Devon and Hereford being extremely light of foot and of lively disposition, have been consequently described as more apt to become wild than any other breed; but this I do not believe. As a lad I was considered a good stock-rider, and it so happens I have had many a gallop after half-wild Herefords and Devons. When they broke away one had to ride through the thick timber at a break-neck pace to head them, but, once headed, they were fairly amenable to the discipline of a bold and skilful stock-rider. I have had only one experience of handling a really wild herd of Durhams, and I remember how fervently I hoped that I would never see one of the breed again. They were much more easily headed than the swifter Rubies or Whitefaces, but directly they became knocked up they charged at once, and they meant charging. I can give an instance of wildness in a well-bred Durham herd of the present day. On their own pasture they are as quiet as pets, but from the time they are put into the trucks to go to market they become perfect demons. A stock agent once said of them, 'They will climb the fence to get at you when in the Flemington yards.' I saw a Devon herd during one of my rambles in Queensland, and found them, as I found all the station cattle I saw in that colony, singularly quiet. But my experience of Queensland cattle is, I admit, very limited. All our domestic animals exhibit a tendency to become wild in Australia if they are neglected. I have known and heard of wild horses, cattle, dogs, pigs, goats, turkeys, geese, ducks, and guinea fowl."—*Live Stock Journal.*

Communications, Books, Journals, etc., Received.

COMMUNICATIONS have been received from Veterinary-Captain J. A. Nunn, Lahore; C. Pack, Lymington; H. J. Dawes, West Bromwich; J. M. Parker, Haverhill, Massachusetts, U.S.A.; Professor McCall, Glasgow; P. Moir, Edinburgh; W. Bryden, Boston, Massachusetts; Hazell, Watson & Viney, London; R. T. Hewlett, London; G. T. Thatcher, London.

BOOKS AND PAMPHLETS: Annual Statistical Report on the Horses in the Bombay Presidency for 1892-93; Bulletin et Mémoires de la Société Centrale de Médecine Vétérinaire; Bulletin des Seances de la Société Nationale d'Agriculture de France; Suggestions for Stock-Feeding in the Winter of 1893-94; Procés-Verbal de l'Academie Royale de Médecine de Belgique; *Dr. Fredericho Boschetti*, Delle Affezioni Carbonchiose in Rapporto colla Setticemia; *G. & A. Gresswell*, The Diseases and Disorders of the Ox; Live Stock Journal Almanac; Encyklopädie der Gesammten Thierheilkunde; *M. Ducasse*, Précis de Pharmacie Vétérinaire Pratique; Bulletin de la Société Royal Protectrice des Animaux de Belgique.

JOURNALS, ETC.: *Agricultural Journal of the Cape Colony; Annales de Méd. Vétérinaire; Revue Vétérinaire; Thierarzt; Repertorium der Tierheilkunde; Lancet; Journal de Méd. Vétérinaire et de Zootechnie; Modern Medicine and Bacteriological World; Archiv für Wissenschaftliche und Praktische Thierheilkunde; Recueil de Med. Vétérinaire; Edinburgh Medical Journal; Clinica Veterinaria; Echo Veterinaire; Journal of Comparative Medicine and Veterinary Archives; Live Stock Journal; Gaseta Medicoveterinaria; Presse Vétérinaire; Field; American Veterinary Review; Mark Lane Express; British Medical Journal; Tijdschrift voor Veeartsenijkunde en Veeteelt; Baily's Magazine; Moderno Zooiatro; Zeitschrift für Veterinärkunde.*

NEWSPAPERS: *New Era; Baltimore Weekly Sun; Times of India; West Middlesex Advertiser; Lancaster Guardian; Glasgow Herald.*